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THE

U. S. NAVAL ASTRONOMICAL EXPEDITION

TO

THE SOUTHERN HEMISPHERE,

DURING

THE YEARS 1849–'50–'51–'52.

Lieut. Archibald MacRae,
Master S. Ledyard Phelps,
Captain's Clerk E. R. Smith,
Assistants.

VOLUME III.

OBSERVATIONS TO DETERMINE THE SOLAR PARALLAX.

BY LIEUT. J. M. GILLISS, LL.D.
SUPERINTENDENT.

WASHINGTON:
A. O. P. NICHOLSON, PRINTER.
MDCCCLVI.

In the Senate of the United States, *August* 2, 1854.

Resolved, That there be printed and bound five thousand extra copies of the Report and one thousand extra copies of the Observations of the United States Naval Astronomical Expedition to Chile: two hundred and fifty copies of the Report and one hundred copies of the Observations for the use of the Secretary of the Navy; one hundred copies of each for the Superintendent of the Expedition; and the remainder for the use of the Senate.

Attest:

ASBURY DICKINS *Secretary*.

CONTENTS.

CORRIGENDA, VOL. III.

Page xxxii, line 36, *for* "dips to the east," *read* "dips to the west."

Page l, lines 4 and 5, *transpose* words "*sum*" and "*product.*"

Page lxii, table, line 3, *for* "Plinus Lib. II, cap. XXII, Ed. Siilig I, 130, [1,]" *read* "Plinius [1] Lib. II, cap. XXII, Ed. Siilig I, 130, [2.]"

Page lxii, table, line 15, *for* "facaltate" *read* "facultate."

Page lxii, notes, line 2, *after* "GASSENDI, Op. Omn. VI, 464," *add* "p. 455, Ed. 1658."

Page lxiii, notes, line 4, *for* "VII p. 115" *read* "VIII p. 115."

Page lxiii, notes, lines 9, 11, Through the kindness of Dr. COGSWELL, of the *Astor Library*, I have obtained a copy of Halley's Southern Catalogue, Ed. Paris, 1679. The needed references are for the parallax, page 80, and for the citation from Streete, page 82.

Page lxiv, notes, line 8, *for* "483" *read* "443."

Page lxiv, notes, line 8, *for* "Ventensk" *read* "Vetenskaps."

Page lxv, notes, line 3, *for* "I, p. 89" *read* "I, p. 4."

Page lxv, notes, line 6, *for* "1768, p. 55" *read* "1768, p. 355."

Page lxv, notes, line 7, *for* "I, p. 4" *read* "I, p. 100."

Page lxvii, text, line 14, *for* "$2406\frac{1}{2}$" *read* "24065."

Page lxxiii, text, lines 3, 11, 13, *for* "$\delta\varrho$ and $\delta\omega$" *read* "$\partial\varrho$ and $\partial\omega$."

Page lxxvi, text, lines 27, 28, *for* "ϕ^1" *read* "ϕ'."

Page cxxiv, star No. 19, column δ, *for* "3″. 2 and 2″. 70" *read* "0″. 2 and 2″. 20."

Page cxxvi, star No. 70, column α, *for* "8 19 26" *read* "8 19 29."

Page cxxxiv, star No. 43, column α, *for* "7 33 49" *read* "7 33 50."

Page cxxxv, star No. 28, column δ, *for* "26 31 16. 25" *read* "25 31 16. 25."

Page cxliv, star No. 28, line 2, column date, *insert* "Nov. 26."

Page cclxviii, line 1, *for* "All the terms containing **n**" *read* "All the terms containing **u**."

Page cclxx, line 15, insert "**w**" after "— 5. 949."

Page cclxx, line 24, insert "**z**" after "+ 20. 674."

Page cclxxi, the second equation should read "$\mathbf{y} = 2''.8970$," &c.

Page cclxxiv, in the first line of column 1 insert "*aa*" within the brackets.

Page cclxxx, the equation line 10 should read "$\mathbf{t} = \mathbf{i}_1 + \mathbf{q}$."

Page cclxxxv, line 6 from bottom, the first equation should read $\mathbf{e} = \frac{\varepsilon_0}{\sqrt{p}}$

				s.
Page 310, No. 3,	*increase*	mean of wires and app. A. R.		0. 09.
Page 310, No. 4,	*diminish*	"	"	0. 20.
Page 310, No. 14,	*diminish*	"	"	0. 13.
Page 310, No. 36,	*increase*	"	"	0. 05.
Page 312, No. 30,	*diminish*	"	"	0. 26.
Page 314, No. 41,	*increase*	"	"	10. 00.
Page 316, No. 4,	*diminish*	"	"	0. 05.
Page 317, No. 2,	*increase*	"	"	0. 07.
Page 318, No. 21,	*increase*	"	"	0. 37.
Page 320, No. 6,	*increase*	"	"	0. 03.
Page 320, No. 19,	*increase*	"	"	0. 44.
Page 320, No. 35,	*diminish*	"	"	0. 06.
Page 321, No. 6,	*diminish*	"	"	0. 28.
Page 324, No. 36,	*diminish*	"	"	0 02.
Page 327, No. 31,	*diminish*	"	"	0. 20.
Page 331, No. 41,	*diminish*	"	"	10. 00.

Broken transits were reduced to *middle* wire, and not to the mean of the wires. A corresponding collimation correction was applied to them.

All other errors detected in the printed observations have been detailed by Dr. Gould, pages cxlv–clxxxv.

ADDITIONAL CORRIGENDA, VOL. II.

Page 6, line 18, *omit* "and clear."
Page 50, line 18, *for* "Putano" *read* "Puntano."
Page 55, line 8, *for* "eight" *read* "eighteen."

ADDITIONAL CORRIGENDA, VOL. VI.

Introduction, page XIV—

For "$\frac{1}{2}$ (A + V) = 11. 318420" *read* "log tang $\frac{1}{2}$ (A + V) = 11. 318420."

For "$\frac{1}{2}$ (A — V) = 10. 216726" *read* "log tang $\frac{1}{2}$ (A — V) = 10. 216726," and *dele* "*tang*" in two places below.

Page XXIV, lines three, two, and one, from bottom, should read—

$$\frac{aa'}{16} = .0000054 \text{ log. } 4.7330296 \qquad \frac{aa'}{16} = .00005339 \text{ log } 5.7275037$$

$$1 - \frac{x}{86400} = \underline{1.0000071} \qquad 1 - \frac{x}{86400} = \underline{1.00000706}$$

$$1 - \frac{x}{86400} - \frac{aa'}{16} = 1.0000017 \qquad 1 - \frac{x}{86400} - \frac{aa'}{16} = 0.99995367$$

Page XXV, line six, should read—

$$T_0^2 \left(1 - \frac{x}{86400} - \frac{aa'}{16}\right)^{.2} \log 1.3648784 \qquad T'^2_0 \left(1 - \frac{x}{86400} - \frac{aa'}{16}\right)^{.2} \log 2.3087424$$

and *dele* sign = on pages XXIV and XXV, between the numbers and their logs.

Page XXVII, I have said of the inclinometer: "It is a modification, by Prof. Kreil and Dr. Lloyd, of the circle devised by Gauss." I was led to this by the following language in a brief notice of these instruments published, page 4 of the "*Supplement to the Magnetical Instructions, &c., by Capt. C. J. B. Riddell, R. A. London,* 1846." "A new dip-circle, to be used with reading microscopes, has been devised by M. Gauss, and constructed, with modifications, by M. Kreil and Dr. Lloyd, &c." It is stated on page XXVI of this volume that the magnetical and a portion of the meteorological instruments for the expedition were made under the direction of Col. (now General) Sabine, to whose earnest interest and assistance we are under the greatest obligations. This distinguished physicist informs me, Prof. Gauss never devised a dip-circle, and that the only instrument used by him was made by Robinson, with a 9-inch needle and single reading lens. The application of verniers and microscopes, and the shortening of the needle permitted thereby, was a suggestion of Dr. Lloyd. Gauss never saw and probably never heard of one of the latter instruments, nor did Prof. Kreil ever see one until the summer of the year 1857, when a set of magnetic instruments, prepared at the request of the Austrian government, under the direction of Gen. Sabine, was forwarded by the latter to Vienna.

ORIGIN AND OPERATIONS

OF THE

U. S. NAVAL ASTRONOMICAL EXPEDITION.

B ○

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During the summer of 1847 a letter reached me from Dr. C. L. Gerling, a distinguished mathematician of the Marburg University, in which he says: "Since the date of my last, I have been occupied with the volume of astronomical observations you had the kindness to send me, and it has occurred to me that it might be acceptable to you to receive by letter, in advance of its publication, the contents of a brief treatise which I shall transmit to M. Schumacher in a few days for publication in the 'Astronomiche Nachrichten.' Should you find my views correct, this will enable you to commence observations in America this year, which, I fear, could not be the case if you awaited a printed copy of the paper. The subject is this: I am of opinion that astronomers act unwisely in considering the solar parallax deduced from the transits of Venus in 1761 and 1769 sufficiently correct, and do not avail themselves of more modern methods of observation for the purpose of gradually acquiring more accurate knowledge of it. It is true, indeed, that the oppositions of Mars were long ago proposed for this purpose; but I am not aware that any effective use has been made of them since 1751, although the Nautical Almanac has regularly furnished an ephemeris. There is, however, a *third* method, which presented itself to me some time ago, and I cannot comprehend why it should have been so entirely neglected—I mean by observations of Venus during the period of its retrograde motion, and more especially when the planet is stationary.

"The delicate and faint crescent form of Venus at the conjunctions offers excellent opportunities for observation; and from what I have been able to accomplish with my small instrument, I have every reason to believe that most excellent results are obtainable with meridian instruments at observatories in opposite hemispheres, but lying nearly under the same meridian. Furthermore, at that time Venus is almost twice as near to the earth as is Mars when in opposition, and observations upon it have the very important advantage that it is not absolutely essential they should be simultaneous, or nearly simultaneous. Again, when the planet is stationary the observations of one meridian may be readily referred to another by interpolation, without risk of error, and at this time it is much nearer to the earth than Mars can be in the most favorable case. Finally, the distance of the planet from the sun being about 29° micrometrical, may be combined with meridional observations. In my opinion, then, it should be our object to multiply meridian observations of Venus about the periods when it is stationary, and endeavor to obtain micrometrical measurements from all parts of the earth, more especially from voyagers. Let us suppose a traveller at a place, *A*, of the southern hemisphere, to observe the planet in the evening at a time T referring it to a projected point of the heavens A, and that it is also observed on the meridian during adjacent days at an observatory *B* of the northern hemisphere: the meridian of the earth, in whose plane projected, Venus was found to be at the time T, will be readily ascertained from its known right ascension, (corrected by the observations at *B*). This terrestrial meridian will also be intersected by the parallel of the observatory at *B* in a point *C*, where a simultaneous observation on the meridian has not,

indeed, been made, but the planet's place may be found for it by interpolation from the observations at *B*. By this interpolated observation, let Venus be placed at a point C of the heavens; then, the celestial arc A C is evidently the measure of the angle under which the known places *A* and *C* appear to Venus, and from this angle the horizontal parallax of the planet must be deducible—the more advantageously the nearer the terrestrial line approaches to a diameter of the earth. I also imagine that it will be of great advantage if astronomers will unite in making careful meridian observations and promoting micrometrical measurements at the stationary periods to the greatest possible extent. For the latter class of observations, however, it is not only necessary that the *times* should be previously considered, but also the attending circumstances, and a list of comparing stars be especially selected. No doubt this will soon be done, should astronomers be inclined to adopt my proposition; but I send you what I have found for 1847, premising that partial examination has also been made for 1849, and that the local stationary point of the latter year offers much greater facilities to observation than the present. * * * *

"The preceding synopsis of my paper will, I hope, reach you in print after a while. Meantime, I beg you will examine the subject, and should you coincide in my views I trust you will interest American astronomers as far as you can, for I flatter myself that observations will be instituted this year at European observatories; and, indeed, I am sure that a greater number of accurate meridian observations are likely to be made during the months of September, October, and November than is common. Besides this, it is more than probable that observatories having the requisite instruments will take advantage of the western stationary epoch to make micrometrical measurements. For the results and success of 1847 it is much to be desired that the few delicate meridian instruments in the southern hemisphere should be brought to co-operate with us; and this, perhaps, it is in your power to facilitate. Of equal consequence will be micrometer observations from the same section of the globe; but as the latter require no permanent observatory, and only a chronometer, a telescope fitted with a micrometer, and a knowledge of the neighboring stars, such observations may well be made by travellers. Whether there will remain time prior to the eastern period for the necessary instruction of voyagers to the southern hemisphere, I am not able to determine."

This letter bears date 17th April, but was not received until the early part of July, and the next eastern stationary term was to occur in September. On conference with the late able astronomer, Prof. S. C. Walker, he suggested the immediate publication of the letter, as the mode most expeditious of making it generally known, and, in accordance with his advice, printed copies of a translation were forwarded to all the astronomers and observatories of the United States with as little delay as possible. There was too little time in which to perfect arrangements for more extended co-operation at that conjunction, and Dr. Gerling was shortly notified that the distribution of his letter was probably all that I should be able to do in the work for 1847. But to prove my interest in the prosecution of the problem to its new solution, I then proposed an expedition to Chile, to observe the planet near its stationary terms and opposition in 1849, should my views receive encouragement from astronomers to justify such an undertaking. Nearly on the same meridian as Washington is the island of Chilóe, a place of considerable trade with the nearer ports, and occasionally visited by American whale-ships. At all events, it was accessible without much difficulty, and I hoped to be able to induce the government to send me there, proposing to leave the United States in time to reach the island by the middle of March of that year at latest. To avoid expense, which it was supposed would prove the first and main obstacle, I contemplated only one assistant, who, like myself, would be an officer of the navy, and in the receipt of pay whether abroad or at home, and would take instruments already belonging to, or under control of the government. I proposed Chilóe, because it was the point farthest south on this continent at which a lengthened winter residence could be endured in exposure without incurring an outlay that might prove a serious impediment, and because I thought that a passage to it could be obtained in a whale-ship from one of

our northern ports. It being inhabited by a civilized and most hospitable people, would tend to render a residence of five or six months in the latter part of the autumn and winter not altogether uncomfortable. Its distance is about 5,000 miles due south from Washington; and a comparison of the observations I proposed to make there with those to be obtained at the Washington observatory, would give us a determination of the parallax from data wholly American. This last reason I hoped would benefit me, should it be necessary to seek the interposition of Congress.

On the 9th November following, I wrote Dr. Gerling more at length, telling him: "When I proposed to you, on the 25th July last, an expedition to the island of Chilóe, for the purpose of making, between the stationary terms of Venus in 1849, nearly simultaneous observations with those of the Washington observatory on that planet, and from them to determine the solar parallax more accurately, as pointed out in your letter of 17th April last, my anticipations were limited to the results that a tolerably skilful and well equipped traveller might be expected to contribute to astronomical science, and my chief reliance was intended to have been on differential micrometer observations. Since then I have had leisure to reflect on the importance of the undertaking, and, remembering the vast outlays Europe has encountered in efforts for the faithful solution of this very problem, as well as in other hundreds of scientific enterprises, and the fact that America, which participates so largely in the benefits derived from the labors of astronomers, has hitherto contributed so trifling an amount to the common stock, I am the more keenly sensible of the noble opportunity now within our grasp to present the world, from our own continent as a base, the dimensions of our common system.

"I hope my desires may not 'prove father to the thought;' but the more I consider the subject, the more firmly am I impressed with the belief that the able minister who has for a length of time presided with universal approbation over the affairs of the navy will not now falter in interest for its advancement, but will hail the occasion offered, and add a new laurel to the chaplet of its renown, a gem to the national diadem. There is but one perceptible obstacle—pecuniary outlay; yet when its very inconsiderable amount is contrasted with the grandeur and importance of the object to be attained, I cannot bring myself to believe that this objection will be suffered to weigh, and I therefore repeat the remark made in my former letter—give the proposition the encouragement of scientific men, and I stand pledged for its successful equipment. At all events, regarding it as a possible attainment only, two questions present themselves for consideration, and it is time they were discussed: first, Is the locality proposed (Chilóe) the best which can be selected for the contemplated object? and, second, Will the instruments which have been specified to you permit the accomplishment of that object in the most satisfactory or desirable manner?

"America offers greater advantages to observatories lying on the same or nearly the same meridian than any other country—its greatest length being north and south. Deeming a station on this continent of paramount consequence, for the reason already mentioned, that it may be a contribution from the New to the Old World, as *cœteris paribus*—the amount of the probable error of the parallax observed will be proportional to the length of the terrestrial base, it is evidently important that the stations from which observations are to be made should be separated as widely as possible. Now, the northern observatories are already established, therefore it becomes desirable that the southern station be made as near to the extremity of the continent as circumstances will justify; and these circumstances are, climate, accessibility, and means of sustenance for the observers during their residence.

"On the first of these points I transcribe somewhat at length the information gathered from various writers on Chile respecting the island named, I now fear too hastily. An islet (Caylin) near its southern shore is called by the natives '*la fin de la cristiandad.*' If the name have meaning, as, in the sequel, you will probably have cause to believe, even did the climate permit, it would not be possible to establish an observatory farther south than Chilóe, without a special ship to convey and take off the observers and their means of sustenance, because it would

constant temperature, as it rains very little during that time.' Bonnycastle, who compiled a work on America, has nothing but what has been copied from the above authors; but the information most direct and recent has been obtained from a small volume entitled 'Repertorio Chileno, año de 1835,' published at Santiago, a city nearly midway between the northern and southern boundaries, and some sixty or more miles from the ocean. This was loaned to me by the secretary of the Chilean legation near this government, and whose personal experience enables him to confirm its statements. It is most unfortunate, however, that the meteorological journal ceases at a period of the year just half way between our interesting epochs. I make a free translation for you from page 1: 'Chile, from the brightness of its atmosphere, the benignity of its climate, and the fertility and productiveness of its soil, is reputed to be one of the best and most delightful countries of the globe. Although the four seasons are distinctly marked, the transition from heat to cold is scarcely sensible. Spring begins on the 21st of September, summer in December, autumn in March, and winter on the 21st of June. From the commencement of spring to the middle of autumn, from Copiapó to Talca, the air is perfectly dry, it being very rare that any others than light rains fall in any year. The rainy season sets in regularly about the end of April, and continues until the middle of September. In the province of Coquimbo it only rains two or three times in the year, and then but for a few hours; in that of Aconcagua, Santiago, and Colchagua, two, three, or four consecutive days of rain are followed by twelve, fifteen, or twenty of clear weather, and so on, progressively increasing to the extremity of Chilóe, where rain falls all the year, and for entire months at a time. Dew, which is deposited copiously throughout the state during spring, summer, and autumn, measurably supplies the want of rain in the northern section.'

"The meteorological journal alluded to as being in the volume was kept at Santiago by Don F. C. Albo, whose records tell as follows: From February 15, 1835, to April 10, of the same year, there were four observations daily, viz: at 4 and 10 A. M., and 4 and 12 P. M. During these fifty-five days, there are 146 records 'clear,' 1 'very clear,' 3 'exceedingly fair,' and 2 'fair;' in all 152, or thirty-eight entire days of fine weather, leaving but seventeen, or one day in three, cloudy. From April 10 to May 12, both days included, there were only 100 records, or three per diem. These were made at times (specified) near 9 A. M., 3 and 11 P. M. Of the 100 notations, 64, or very nearly two thirds, are 'fair,' and the larger portion of the remainder are either 'cloudy' or 'partially cloudy.' There were only eight rains in the whole thirty-eight days, and this, too, the middle of autumn in central Chile—certainly a state of the atmosphere not known to this part of the globe at the most favored season of the year.

"Now, I pray you will not misunderstand my motives for the remarks and quotations respecting the climate of Chile, but remember, there can be no personal preference for a station. My desire is to contribute the utmost to the solution of the great problem, and to render the most effective service which the locality selected, and the instruments committed to my charge, will permit. If astronomers say, take the longest base and go to Chilóe, or even to a more southern station, I will cheerfully acquiesce, and undertake the task with the same alacrity as though the duties were to be rendered at Copiapó or Valparaiso; but it is due to the object to be accomplished, as well as to myself, to submit these points, that I may not hereafter be charged with the selection of a station unsuited to observations. Reflect on the subject and advise me what shall be done.

"Fortunately, the second question propounded may be more briefly despatched, viz: Will the instruments named in my former letter permit the accomplishment of the object in the most satisfactory or desirable manner? I have already told you, that in writing that letter, my expectations were limited to the results of micrometrical measurements. But as meridional observations of the declination are free from the errors necessarily tending to vitiate those made differentially near the horizon with even a permanently placed parallactic telescope, I am satisfied that the objects of the enterprise can only be properly fulfilled by furnishing it with a circle of not less than thirty inches diameter, whose divisions shall be read with micrometer

microscopes, and with which, as expressed in your letter of 2d September, '*Declinations*, Bestimmungen gemacht werden, welche in Genanigkeit denen von Washington gleich kömen.'

"We have not such a spare instrument belonging to the navy. One was shown to me a few years ago at Cambridge, Massachusetts, (I think,) and in 1843 Mr. William Simms told me in London he had recently (then) constructed one about that size for the university at Tuscaloosa, in Alabama. One or the other of these may probably be obtained for the Expedition. If they cannot, or are unsuited to the purpose, either Mr. Simms or one of your German artists could construct one by next July, and I feel confident the Minister of Marine will authorize it should he determine to patronise the enterprise.

"I think additional value would be given to certain of the differential micrometer observations, if they could be made at the two observatories with the same stars at the same, pre-appointed, instants; it being understood that both before and after these instants the greatest number of measurements be made which the condition of the atmosphere will permit. Of course, the circumstances of the refraction at the two stations will be different, but interpolations for changes of declination will be avoided; and I know, from long experience in the *term-day* observations of the German magnetical association, how much accuracy one strives to attain, as well in the instants of time as in the coincidence of the observed object with the micrometer wire when he knows there are other observers whose faculties are directed to the same end at the same moments, and whose results are to be competitors.

"One other instrument will be found necessary, as well to inspire the observer with confidence in his work, as to afford the means of obtaining satisfactory determinations of the planet's right ascension, which may be used for comparison with the Cape of Good Hope and Paramatta observatories. I mean a good astronomical clock; for experience has taught me that the rate of chronometers from day to day is not sufficiently uniform to be relied on for work so delicate. Such a clock we already have, and as it is not employed on necessary service, it can doubtless be obtained; and I take it for granted that the two observatories mentioned will co-operate with us as soon as they know that our station has been selected."

A third letter from Dr. Gerling, transmitting the opinions of Gauss, Encke, and Boguslawski, came very shortly afterwards; and on the 24th December he again wrote me, part of which, in reply to my last, is as follows:

"Whilst I promptly acknowledge the importance of yours, and the gratitude with which it inspires me, I candidly confess that the decision you ask of me respecting the proper locality for the observations of 1849 gives an importance to my judgment I would not voluntarily assume; for it is evident to me that such a decision can only be properly arrived at by yourself and your American friends. Yet, in your own spirit of candor, I will tell you the reflections which would influence me in arriving at such determination.

"From the greater length of the base of operations, Chilóe would possess an unquestionable advantage; whilst Valparaiso really appears a preferable station, by reason of its better climate, and not on account of its lying nearly on the parallel of the Cape of Good Hope, as Boguslawski, in my opinion, erroneously adduces. I coincide with you fully that a difference of longitude of one or two degrees is altogether unimportant, if other benefits may be obtained by a change; and the question thus reduces itself to a comparison of the *dis*-advantage of shortening the base with the *advantage* of an increase in the number of observations. Now, assuming the latitude of Washington to be 38° 53′ north, Chilóe 43° 05′ and Valparaiso 33° 02′ south, (neglecting differences of longitude,) we have Washington–Chilóe 1.312 radii of the earth, and, on the other hand, Washington–Valparaiso 1.174. Consequently, this shortening of the base will diminish the value of the work in the proportion 1.174 : 1.312—that is, approximately as 17 : 19. But if by an increase in the number of observations this unfavorable change may be counterbalanced, we have to consider that (cæteris paribus) the accuracy of the results increases only as the square root of their number. Hence it will be necessary to multiply observations in the proportion of 19^2 to 17^2, or 361 : 289, or nearly as 5 : 4. Consequently, Valparaiso will

be preferable to Chilóe, if it be probable that five observations of the planet may be obtained at the first as frequently as four can be made at the second station. You will, of course, understand me as meaning Valparaiso only as an example for your letter, and that the same principle of reasoning must be applied in the selection of any neighboring locality. Yet, I repeat, a decision of this question must rest wholly with you in America, where you, undoubtedly, have at command nearer and more copious sources of information respecting the climate than we, and more particularly than myself, who have never given thorough attention to subjects of this nature. But, whatever may be your decision, I can but congratulate myself that by the communication of my views relating to observations on Venus, I may prove the remote cause of so great and important an enterprise.

"I greatly rejoice that you have reasonable expectation to obtain a good circle for the Expedition, to serve you in the declination observations; for I am confident such an instrument will give glorious results. And that a valuable clock is also probably at command, is a subject of much congratulation. Should you find the opinions of others useful in enabling you to procure these instruments, that of Gauss, which was copied into my last letter for you, may prove of considerable weight.

"I fully concur with you in the belief that the value of the micrometrical observations will be much increased if they are made at the two stations on the same stars at periods as nearly as possible simultaneous; and to this end I shall forward to you, at the earliest possible day, a list of stars selected from the Berlin charts. But I do not immediately perceive any great benefit likely to accrue from a comparison of the right ascension observations made on the meridians of the respective parallels, unless, as intimated, we should succeed in obtaining extrameridional observations of Venus whilst the sun is above the horizon, and *simultaneous* measures of the eastern and western hemispheres may be combined. Irrespective of the last contingency, I cannot but regard your views directly to the point, and am satisfied we should endeavor to make a multitude of observations in the northern and southern hemispheres, if possible, absolutely simultaneous. By so doing we shall especially obviate a difficulty of an important character, but one which did not occur to me until after I had despatched my last letter, viz: uncertainty in the time of the determination; for, as the parallax of Venus when approaching the horizon is expressed by the greatest numbers, so also at that time its variation is the most rapid, and the necessity for accurate knowledge of the instants of observation proportionately greater. The simultaneous observations you propose will certainly remove this disadvantage."

Meanwhile, the early letters of Dr. Gerling had, with my own, been submitted to the American Philosophical Society and the Academy of Arts and Sciences, to Professors A. D. Bache, Benjamin Peirce, S. C. Walker, Elias Loomis, and others eminent for mathematical and astronomical attainments, from each of which there was solicited impartial investigation of the method and proposed mode of carrying it into effect, and a recommendation of the Expedition to the favorable consideration of the government, should they believe it likely to obtain useful results. Prof. Bache replied:

"As was no doubt expected, the searching examination to which your proposal has given rise has nearly exhausted the various bearings of the problem. The importance of the inquiry is very generally admitted. In discussing the question of the probability of obtaining new data for the solar parallax which shall diminish the probable error of the value obtained from the transit of Venus, there are different shades of opinion expressed. I do not see, however, that the two reasons which strongly favor Dr. Gerling's method are met by any opposing arguments. The large number of observations upon which results may be founded, and the independence of the new method with that formerly used, are, indeed, striking features in this method. Independent methods give the best confirmation of results, or show errors beyond the accidental error deduced from calculation of observations which are all made by the same method.

"There can be no doubt that the instruments to be employed should be of the class used in

observatories, and not small, portable ones. The futility of an attempt with others is well pointed out in the correspondence. The procuring a suitable meridian circle will constitute, I suppose, the greatest expense of the Expedition. Without entirely suitable instruments and ample time for the observations, the Expedition would, of course, fail in accomplishing its main purpose.

"As is well pointed out in the correspondence, if the Expedition should result in showing that no new strength could be given by this method to the value of the solar parallax, the indirect results from other observations would be most valuable; no similar expedition has ever been barren of scientific results. In this view of the subject, meteorological and magnetical observations should be combined with the astronomical observations.

"I have no doubt that you can present a plan to the honorable the Secretary of the Navy so well matured in its details, and so moderate in the expenditures required, that he will give it that favorable consideration which the character of his mind insures to such objects, and that if no untoward circumstances prevent, he will yield the plan so considered that hearty support which he has always extended to similar proposals for elevating the scientific character of our country."

On the 18th December, Prof. Peirce informed me: "My long delay in answering your very interesting communications relative to your proposed expedition for determining the solar parallax demands a serious apology. I assure you most earnestly that it did not arise from a want of sympathy with the scientific zeal and devotion which have prompted you to this arduous enterprise, nor from a want of appreciation of the importance of a new and more accurate solution of a problem which is the basis of all astronomical measurement, and of which there is now a single isolated determination. I have delayed only that I might give the question a calm, deliberate, and critical examination; and, although fully aware of the little weight which should attach to the opinion of one whose knowledge of practical astronomy is not derived from personal experience, yet, since you have done me the honor of asking it, I have felt that I should doubly err if I should answer without the most careful consideration, and should thus assist in sending a friend and most valuable and highly accomplished officer upon so dreary an expedition with doubtful prospect of success.

"A more accurate measurement of the sun's parallax in the method proposed by yourself and Dr. Gerling cannot be regarded as inferior in importance to any problem in practical astronomy; and when sustained as to its practicability by the opinions of Dr. Bache and Mr. Walker, whose authority upon the use of astronomical instruments can be weighed down by no living testimony, there can be no further question as to its expediency. Most cordially, therefore, as well as deliberately, I send you my humble testimony in favor of the enterprise you have so much at heart and are so certain to accomplish, if it is, as it appears to be, within the bounds of reasonable possibility. Let me entreat you, however, not to be satisfied with anything inferior to the best possible instruments which art can furnish, for such instruments seem to me absolutely indispensable, while the admirable observations which you have published are a sufficient guaranty for the skill with which you will conduct their manipulation.

"I shall bring the subject before the Academy early in the month of January, and shall be greatly disappointed if a resolution is not immediately adopted in approbation of your project."

When acknowledging the receipt of this personally complimentary letter, the arguments which had weighed with me to desire such an expedition were detailed somewhat at length. A note accompanied it, suggesting one or two obstacles almost sure to be encountered, and these were replied to at the same time. A part of my letter was as follows: "Remembering that the solar parallax deduced by various astronomers from the transit of Venus in 1769 was discrepant at least 0″.4; that, in a climate reputed as favorable as is (northern) Chile, we might expect to obtain observations on at least two out of each three days; that therefore the ninety days during which it is proposed to continue observations will give us sixty determinations of the parallax, each of which might have a probable error of less than 1″, and the resulting final

error be as 1″ divided by the square root of 60 = 0″.13; and, lastly, that the attainment of such a solution, if accordant in individual results, would, at all events, place the parallax beyond cavil, it did appear to me an object worthy a great effort to achieve for our country and its navy. I am convinced such a result can be attained in a single inferior conjunction; and that I can accomplish it, if a suitable instrument be given me, and as close an observer have charge of the northern circle, I am willing to hazard whatever of reputation as an observer may have been awarded to me. If the period of simultaneous observations is to be extended to another conjunction, the probable error will, of course, fall within 0″.1, and such continuation of the series appears to be the desire of all who have communicated with me on the subject.

"Entertaining these opinions, the letter of July 25 was written to Dr. Gerling, and in a short period the correctness of my judgment was confirmed by Messrs. Bache, Walker, and Loomis, all gentlemen thoroughly versed in the theory as well as in the manipulation of instruments. *This* was sufficient incitement to leave no effort untried to secure the honor of the observations for American science. Dr. Gerling's letter of September positively decided me; and should he procure recommendations of the Expedition from German astronomers, as therein promised, I shall leave nothing undone to the fulfilment of my portion of the engagement.

"Between the date of my letter and the receipt of that last alluded to, the subjects of parallax and climate of Chile were made matters of especial examination. It was not until then that I became acquainted with the close agreement of the results of Encke and Ferrer upon a discussion of *all* the observations of 1769, and will candidly confess that this, together with the unfavorable accounts gathered of Chilóe, if not quite so dampening to my zeal as is the (reputed) climate of the station selected to the skins of Chilotes, was yet very far from a character to afford encouragement. But, as I have never suffered minor obstacles to deter me from the prosecution of a worthy task, and the following good reasons exist why the work should go onward, I am prepared to make every promise good to its fullest extent.

"First. The solar parallax rests on the isolated deductions from the transit of Venus, as observed in 1769, a part of which observations are, demonstrably, forgeries, a part supposed to have been 'coaxed,' (as generally termed 'cooked,') and another part, viz: at Santa Ana, in California, made or manufactured by one scarcely rational. Those of Mars at opposition in the last century, which are referred to by Encke in his *Venus durchgang von* 1769, and by Dr. Gerling in his letter of April 17, I have not been able to find here, and, apparently, there is but one other occasion when this method has been made use of. Prof. Henderson made a comparison of the Cape of Good Hope observations of Mars, at opposition with nearly simultaneous ones at Cambridge, (England,) Greenwich, Edinburg, and Altona; and though those made at the first named northern observatory, combined with the Cape measures, gave a parallax agreeing very well with the received amount, the comparison with the others afforded a result exceeding 9″. These two modes, and the only ones tried, do not rest on a sufficient number of observations. The advanced state of astronomy demands their confirmation, and the removal of whatever of doubt may hang over the solution of the problem.

"Second. The method proposed by Dr. Gerling *is the only one* remaining untried by which we can ever arrive at a knowledge of the parallax; and as this element may be positively ascertained during two inferior conjunctions within the limits of 0″.09, its investigation, in the manner matured by him, is not only desirable, but its accomplishment will be alike honorable to the nation that directs and the astronomer who accomplishes it.

"Third. Considering the second reason incontrovertible, the magnitude of the object involved renders it well worthy the patronage of the government. Now, as we can hope to enlist our countrymen in scientific enterprises only by their so frequent recurrence as compels belief in their national utility, and as many years have elapsed since voluntary part has been taken in any work of this character, (*vide* the Exploring Expedition, 1835), unless we wish all interest in like pursuits to be lost, it is time rulers were again called on to act, and the present occasion, perhaps, emphatically addresses itself to us—there being high honors attainable at little cost.

"As they are of much weight, there are collateral reasons which it is proper that I should state to you. On the second page of the preface to his *Venus durchgang*, Encke says: 'Until 1874, there is no hope of obtaining in this manner (by transits of Venus) a more accurate knowledge of the solar parallax. The celebrated measures for the parallax of Mars, in the middle of the last century, gave that of the sun within the eighth or twelfth part; but this latter method is of no other practical use than as it encourages a hope that, by a greater perfection of instruments, we may become more independent of the transits of Venus, which occur so seldom.' And on page 109, he says:

"'The probable error in the observation of a contact being *seven seconds*, is so great as to render the determination of the sun's parallax within 0″.01 almost hopeless for the next two centuries. Such precision would have required a hundred observers at Wardhus, and a like number at Otaheite; whilst the difficulty of placing even thirty good and independent observers in the vicinity of each of the best stations is so great, that it can hardly be expected we shall attain such accuracy from any one transit.

"'All the observations of 1761, together, have but a value equal to three complete observations of the duration at Wardhus, compared with as many at Otaheite. If the weather had been good at the eight northern stations in 1769, and there had been eight good observations of the duration at the Friendly islands, these eight comparisons would have been as valuable as the two hundred and fifty observations of the two transits actually made. In comparison with that of 1769, the next two transits will be so unfavorable, that nothing short of perfection in the construction of instruments, and art of observing, can be expected to compensate for it.'

"We must, therefore, assent to the present calculated parallax for more than a century and a half longer; make another essay with Mars, or adopt the plan proposed by Dr. Gerling. Now, does the present state of astronomical science require this trial by us, or will it be advanced thereby? I feel confident that you, and all who reflect on these facts, will agree with me, that to *confirm* the accepted 8″.5776 within 0″.09, even should no other astronomical result be derived from it, is well worthy the expedition proposed to southern Chile, and the honor of its achievement not unworthy of American emulation. Moreover, though I need not have reminded you of it, perhaps, should the observations be continued through the stationary terms of Venus in December and January, 1850–'51, as several astronomers regard essential, the intermediate opposition of Mars will occur, which may be made use of with greater probability of success than at the Cape of Good Hope on the previous occasion, it being at that time the summer of the southern hemisphere; and we shall also be enabled to obtain a parallax in right ascension, as well as in declination.

"A few words more directly in reply to the two difficulties suggested as certain to prove obstacles in attaining 'results comparable in accuracy with the old determinations of the parallax from the transit of Venus,' and I shall have done. And first, as to the probable error of absolute declinations from a series of observations. Messrs. Bessel, Struve, Airy, and Argelander, are such authorities, it would, apparently, be highly presumptuous to say that any one could make better measures. But did either of those distinguished astronomers ever follow up a star in declination for a year? I greatly question it, as refers to the Germans, and know (from the Greenwich observations) that Mr. Airy leaves such, indeed ninety-five hundredths of all observations, to his assistants, with whose accuracy I trust I may be permitted to compare, for, if what Mr. Walker says be true, my probable error is less than that of any known observer. Encke admits, page 30 of the volume quoted, that the probable error of observation at a station may be only 0″.5. But I propose a form of instrument and method of observation which, united, will necessarily cause many of the ordinary discordances of observation to disappear, and thus your apprehensions on this point be quieted; that is, I want a circle whose axis shall form a part of its telescope, and intend the nadir point to be examined immediately before and after each series of observations. This construction of the telescope to me presents one, or at most two, disadvantages. The first and most important is, greater instability in the

collimation line; and the other, partial loss of light by reflection from the prism. As the collimating eye-piece and level may be made mutual checks, and *theory* gives us total reflection from a prism, I am not satisfied that either are valid objections. To counterbalance these, if actual demerits, the frequent uncertainty as to the amount of flexure and its positive source of error, the risk from mounting a tall ladder to examine the nadir point, and of disturbing the instrument when rising after the observation of an object near the zenith, are all in a great measure avoided, whilst the labor of the observer is facilitated by having the micrometers next him, and the accomplishment of his task in a uniform position, and that, the most perfectly natural attitude of his body. Should the telescope have a micrometer at its eye-end for both vertical and horizontal measurements, the uncertainty of semi-diameter and the effect of irradiation will be partially avoided, and a suitable screen can be constructed to shield it from solar heat, as well as from that of the person. Are there other objections to such construction of the instrument that I do not anticipate, and which would render it improper?

"Secondly: I have not so great confidence in the results of micrometrical determinations, except on occasions when, in consequence of the orbit of Venus lying near large stars, we may be enabled to make comparisons by daylight. There will be two such periods at each conjunction—of 1849 and of 1850–'51; and if we obtain simultaneous observations from the Cape of Good Hope and Paramatta, as I doubt not we shall, a parallax in right ascension will be measured at the same time.

"If the government be pleased to authorize the Expedition, be assured I would not even undertake its equipment without personal consultation with one whose ability and judgment command my admiration as warmly as his personal merits entitle him to my esteem."

On the 7th January, 1848, a committee of the American Philosophical Society, consisting of Profs. R. M. Patterson, R. S. McCulloh, and E. Otis Kendall, reported as follows: "That the method for determining more accurately the dimensions of the solar system by similar observations of Venus in the northern and southern hemispheres, at the conjunctions of that planet, proposed by Dr. Gerling in his letter to Lieut. Gilliss of April 17, 1847, is in their opinion practicable, and therefore worthy of attention and patronage. Also, that the plan of Lieut. Gilliss for carrying the views of Dr. Gerling into effect is well conceived, and if successfully accomplished, cannot fail to confer honor on our country and its naval service.

"They respectfully remind the society that, in the year 1769, observations of the transit of Venus, for the determination of this important astronomical problem, were made by Dr. Rittenhouse and others, under the liberal patronage of the government of Pennsylvania, then a British colony, which observations were of great value, and justly reflected much honor upon the colonial government, and particularly upon the distinguished men who were engaged in making them. As the subject is, therefore, one which is already connected with the history of American science, under the auspices of government patronage, as our country has hitherto contributed but little, comparatively with the other principal nations, to astronomy and navigation, and as the plan of Lieut. Gilliss is so truly American, your committee suggest that the society should commend it earnestly to the attention and patronage of the Navy Department; or, if that department should not possess the legal authority to carry it into effect, to the favorable action of Congress. And they therefore propose the following resolutions:

"*Resolved*, That the proposed method of Dr. Gerling, of Marburg, for determining the solar parallax by observations of the planet Venus, when stationary and at the conjunctions, and the plan of Lieut. Gilliss for its accomplishment by means of similar observations at the Naval Observatory at Washington and in South America, would, if successfully carried out under the direction of the Navy Department, furnish valuable astronomical data, and confer honor upon our country.

"*Resolved, therefore,* That this society do hereby commend the proposed plan to the favor and adoption of the present distinguished head of that department; or, if necessary, to the Con-

gress of the United States; and that, in testimony of the opinion of this society upon this subject, an official copy of these proceedings be transmitted to the Secretary of the Navy."

The resolutions were adopted unanimously on the same evening, and were transmitted through me. A few days afterwards I received from the Corresponding Secretary, Dr. Asa Gray, the opinion expressed by the American Academy of Arts and Sciences. It is in these words:

"*Resolved,* That, in the opinion of this Academy, the enterprise for determining the solar parallax in the method proposed in the correspondence between Lieut. Gilliss and Dr. Gerling is worthy to be promoted by the government of the United States, by sending an expedition to Chilóe, both on account of the great uncertainty which attends the adopted value of this fundamental basis of astronomical measurement, and from the probability that this attempt will prove successful, and thus redound to the honor of the country by which it is undertaken.

"*Resolved,* That a copy of this resolution be transmitted by the Corresponding Secretary to Lieut. Gilliss, with a request that he will communicate it to the public authorities who may have the subject under their consideration."

These quotations from a document printed by Congress (30th Congress, 1st session) will have shown the origin and initiatory steps leading to the Expedition, and it is scarcely necessary to republish in this place testimony from other correspondents repeating nearly the same arguments. Foreign astronomers were far less sanguine of any results likely to set aside the value of the solar parallax adopted from discussion of the transits of Venus; but the question of collateral benefits to science from such enterprise was not mooted by either of them, or, doubtless, they would have been equally strong in its recommendation. So far as my personal support could go, my mind was fully made up. Resolved to give the method of Dr. Gerling a faithful trial, and endeavor to accumulate other data to render the Expedition valuable in case no useful results should be deducible from the observations on Venus, on the 10th February the testimonials and correspondence were laid before the honorable Secretary of the Navy. Entreating their careful perusal by him, I proposed:

That he should furnish me with instruments already within the control of the department; one assistant, an officer of the navy; and authority to embark for Valparaiso, or other port in Chile, to make observations there from February, 1849, until April, 1851. Should he be pleased to grant this, I pledged myself that the expenses of every kind, exclusive of instruments, should not exceed five thousand dollars.

Not only were there influences to prevent its favorable consideration by the department, but it was not until the last day of March that the alternative presented by the American Philosophical Society was adopted, and the honorable Secretary referred the matter to the action of Congress. There, the papers were appropriately sent to the Naval Committee, and within a fortnight the Hon. F. P. Stanton, of Tennessee, made the following report:

"The Committee on Naval Affairs have had under consideration the correspondence submitted by the Secretary of the Navy, in his letter of the 31st March, 1848, and they beg leave to present the following views of this interesting subject:

"It is proposed to set on foot an expedition to the most southern available position on the Western Continent, for the purpose of making observations on the planet Venus, during the period of her retrograde motion, in conjunction with similar observations to be made at the observatory in this city, with a view to the more accurate determination of the solar parallax, which involves not only the distance of our own planet from the sun, but the dimensions of the orbits of all the bodies of the solar system. These observations, if successfully made in the manner proposed, will present data *solely American* for a new and independent determination of this most important element—an element which enters into all our determinations of longitude, affecting the accuracy and safety of all such calculations, and therefore possessed of the highest possible utility, not only to the government, but to all the enterprising citizens of our country. In this view the expedition commends itself to us for warm encouragement and effi-

cient aid in its promotion. It has been proposed by one of known zeal, industry, and ability in astronomical observations, whose personal efforts will not be wanting to bring it to a successful issue.

"The plan is one which emanated from Dr. Gerling, of Marburg, well known for his astronomical and geodetical labors, and communicated by him in a letter to Lieut. Gilliss, dated April 17, 1847, in which he earnestly seeks for it the co-operation of American astronomers. It contemplates two series of observations, each bearing upon the question of parallax, but in different ways, and independently of each other. One series is to be made with meridian instruments, at stations as remote from each other in latitude as practicable, and will consist of differential measurements in declination between Venus and the brighter stars near its path, which are visible in the daytime. To render these available in the question of parallax, the distance between the observatory at Washington and the proposed station at Chile will afford an ample base of 6,000 miles. The other series embraces differential observations out of the meridian, more particularly in right ascension, and which, in cases of the planet's near approach to any star, can be made with the utmost nicety. A few instances of near approach to some of the brighter stars may be selected, when the two bodies can be followed throughout the day. And, in such case, full series of observations, with a well-mounted equatorial instrument, would be among the most valuable for the proposed object, and their value would be increased by combinations with others of a similar kind at other and remote stations.

"For such observations it is proposed to occupy some point in Chile as an astronomical station. So far as they may be available in the determination of the solar parallax, or even for the confirmation of previous determinations, they will be of the highest interest. But, apart from this primary object, the expedition and the observations contemplated commend themselves upon other grounds to the warm interest of all astronomers and lovers of science. The perfection of these observations will require others upon other objects, and the whole will be a just tribute of America and American astronomers to their co-laborers in a science to which our country is largely indebted for the prosperity of some of its most important interests. No such expedition has ever returned without rich fruits, even of different kinds, and gleaned from different fields from those for which it was originally designed.

"The fact that a quantity so essential to our accurate knowledge of the solar system as the sun's parallax should rest for its determination mainly upon observations of a single phenomenon—the transit of Venus in 1769—is sufficiently indicative of the necessity and high value of the proposed measure. So important for this purpose, in the eyes of astronomers, were deemed this transit and the previous but inferior one of 1761, that we find them scattering themselves over all parts of the habitable globe, wherever the phenomenon could be advantageously observed. In 1761 they occupied stations from the remotest regions of Siberia to the southern extremity of Africa, in the wilds of Arabia, and on the islands of the Indian sea. In 1769, with even greater zeal, they scattered over Europe, America, and the South Sea islands, to observe one of the rarest, most interesting, and important phenomena which the annals of astronomical science afford. Not only the learned societies, but the governments of Europe, encouraged and aided the laudable undertaking. And, even in that day, American astronomers shared in the labors, and reaped their portion of the honors of the great occasion; yet the zeal of all was not rewarded with success. Unfavorable weather at some of the most important stations either seriously impaired or entirely prevented observations. At others the observations have been regarded with suspicion, or as deserving little confidence. And the distinguished Encke, who has given the most thorough and scrutinizing discussion of all these observations, although he assigns to his resulting parallax the small probable error of 0''.05, yet, near the close of one of his admirable treatises on the subject, remarks that, 'had the weather been favorable at all eight of the northern stations in 1769, and had as many astronomers stationed themselves at different points of the Friendly islands, their sixteen observed durations alone would have afforded a more accurate determination of the parallax than the whole 250 equations

of condition derived from both transits.' But, compared with the transit of 1769, he speaks of the next two transits—those of 1874 and 1882—as unfavorable for this purpose, presenting 'disadvantages which even the perfected state of instruments will not counterbalance;' and in view of the extremely rare occurrence of these phenomena, and of the unfavorable character of several succeeding ones, he intimates that, for three thousand years the transit of Venus of 1769 may remain as the chief means from which we are to derive our knowledge of the actual dimensions of the solar system. At any rate, it will not be before 1874 that astronomers can avail themselves of a transit of Venus for even an imperfect verification of Encke's parallax; and centuries will elapse before the recurrence of one as favorable for the purpose as that of 1769. But even for the expiration of these twenty-six years the rapid advance of science will not permit them patiently to wait. The progress of astronomy, and the interests of navigation, require an earlier confirmation or re-determination of a quantity so important; and astronomers will watch with deep interest the accumulation of observations which will bear upon this point, and which, if even less perfect in themselves separately, will yet finally, by their numbers, and the variety of circumstances under which they shall be made, be entitled to weighty consideration.

"Two methods have been suggested—one by observations on Mars, which has been only partially tried, and with but partial success; the other, the one which it is now proposed to attempt, and which offers a decided advantage in the greater proximity of Venus to the earth. It has been proposed to astronomers from a respected and distinguished source. It comes to us recommended by other names of high authority, and by two learned bodies of our own land—the American Academy of Sciences, and the American Philosophical Society.

"But, although the proposed expedition of Lieut. Gilliss is for carrying out chiefly the latter method, it need not, and will not, preclude the other. And the various other observations he will be able to make during the two years he proposes to devote to this work, will furnish a rich and valuable series; for which alone, entirely apart from the consideration of the main design, astronomers and scientific men in other spheres, as appears from the accompanying correspondence, have applauded and warmly commended his purpose.

"But the main design itself is not without the best prospect of success. The committee are informed by practical astronomers, that, taking for example the proposed meridian observations, with the nicely constructed instruments of the present day, and good observers, 0″.7 would be a large estimate of the probable error of each observation. The probable error, then, of the solar parallax, deduced from two such observations at stations as distant as Washington and the proposed position in Chile, will be 0″.3 to 0″.7, according to the distance at the time of Venus from the earth. And the error of the result, from an accumulated number of such observations, may be rendered very small, provided no constant uneliminated error remains, which will be common to them all. But the liability to such errors can be greatly diminished by the skill of the observers, and their careful attention to all the circumstances which may affect their problem. And this liability to error will be still further diminished by combining the results of the meridian series with those from the extra-meridional observations contemplated, and which will have been made under far different and more variant circumstances. These common errors, the computation of probable error does not include; and it may be doubted whether the resulting parallax of 1769 is wholly free from the effects of such. Astronomers aim, ever, that their results shall be deduced from observations as extended, made under circumstances as varying, and with means as different as possible. And, in this respect, the determination of the solar parallax, as yet, stands almost alone as the result almost of a single phenomenon.

"But the committee do not deem it necessary to enter further into a subject which is so fully discussed in the interesting correspondence attached. They are fully impressed with the importance of the object in view; and as the sum required will not exceed $5,000, they report an amendment to the naval appropriation bill to enable the Secretary to accomplish it. All of which is respectfully submitted."

The amendment so reported was duly sanctioned by both houses of Congress; and on the 3d of August the President approved a law in which was incorporated a direction to the Secretary of the Navy to expend five thousand dollars, or so much thereof as might be necessary, in making "the observations recommended by the American Philosophical Society and Academy of Arts and Sciences." Preparatory orders for the performance of this service were sent to me shortly afterwards, together with authority to adopt such preliminary measures as I might consider expedient. Evidently, conference with the members of the two societies, whose recommendations were made the basis of action by Congress, was an essential; and I proceeded to Philadelphia and Boston, laying my detailed plan of operations before them, and inviting amendments. I quote it here:

"The purpose for which an appropriation was solicited to send out an expedition to the southern hemisphere being the collection of data which shall add to the accuracy of our knowledge of the solar parallax, observations to this end will, obviously, demand paramount attention. Two distinct phenomena will occur during the period proposed to be devoted to the subject in Chile, by the investigation of each of which, we may reasonably hope to deduce tolerably correct information of the true parallax, and of the absolute value of the received constant. Taking them in the order of their occurrence, they are:

"First. *The opposition of the planet Mars, commencing towards the close* (*November* 17) *of* 1849. As an ephemeris of the stars proper for comparison with the planet on each day has been selected at the Nautical Almanac office, it should be scrupulously adhered to by the observers at every station. Two classes of observations of this planet may be made advantageously. 1st. Simultaneous extra-meridional measurements at pre-arranged times, [between the observatory in Chile and that at the Cape of Good Hope, the planet to be about three hours past the meridian of the latter, and three hours from the meridian of the former station. The time should be reckoned from the meridian of Greenwich, as better known than Washington; and the longitude of the southern station be ascertained with the greatest precision possible in a preliminary investigation. A comparison of these differential measures will afford a parallax in right ascension; and as in them the differences of right ascension between Mars and the selected stars are wanted, the diaphragm to the micrometer of the telescope should contain at least five vertical wires, that it may be used as a transit instrument. Once directed so that both objects will traverse its field, the telescope should remain undisturbed until the time of transit of each has been recorded for every wire. It is doubtful whether an analogous series can be obtained from the observatory at Paramatta, which lies nearly on the same parallel, because of the planet's great northern declination and proximity to the horizon, when equidistant between the two meridians. But similar series made at the same stations before and after culmination will furnish valuable data, and these may be repeated *ad libitum*.] Differential measures of declination should occupy a portion of each night for combination with others to be made at the northern stations, and it is not doubted that the value of these [also] will be increased if made in both hemispheres at the same instant. 2d. Meridional observations. These being chiefly to determine the parallax in declination, in order to guard against errors which may possibly creep into measurements of absolute zenith distance by fluctuations of the circle zero, caused by handling, it is suggested that the following method be adopted, viz: determine the nadir point of the circle by reflection of the horizontal wires from mercury, immediately prior and subsequent to the passage of the first and last comparison stars over the meridian, and, when practicable, give differential measures with the micrometer screw positive preference over changes of altitude in the circle telescope. This last may readily be the case when the declinations do not differ more than 20′, as frequently offers in the ephemeris for 1849–'50. One limb of Mars should be observed with the fixed horizontal wire, the other with the nearest micrometer wire; the transits at the I, III, V, and VII wires; and the altitudes, especially, at the II, IV, and VI. The same remarks are applicable to observations proposed to be made at the opposition of the planet in 1852.

"Second. *Observations of Venus about the times of the inferior conjunctions with the sun, and more particularly near its stationary terms.* The earliest series of which it will be practicable to take advantage will commence in the autumn (spring of Chile) of 1850; the latest that I contemplate observing will occur in the summer (winter) of 1852. And thus the results of two returns of each phenomenon will be brought to bear on the problem of parallax. As in the case of Mars, the observations are divisible into two classes—meridional and extra-meridional; though, from the vicinity of the planet to the sun, the results derivable from the latter do not appear to be regarded with the same degree of confidence. I propose to commence the principal series, and to continue it as long as the horizontal parallax amounts to 15″—that is, about 110 days; and to this end will prepare a map of that portion of the heavens in which the apparent orbit of Venus lies, projecting thereon all stars within 30′ of the path which are contained in published catalogues. The map, and a list of stars to be selected from it that will best serve for daily micrometrical comparison, will be sent to every observatory to facilitate the observers' acquaintance with the heavens, and insure certainty of comparison with the same star. Similar remarks to those respecting the extra-meridional observations of Mars apply here also; if any such be found near the orbit, a bright star will serve for simultaneous pre-arranged comparisons during daylight with observatories lying near the same parallel for a parallax in right ascension. Dr. Gerling also advises the comparison of differential extra-meridional observations made under one meridian, with meridian observations made under another in the opposite hemisphere, the motion of the planet in the intervals of time to be derived from the Nautical Almanac by interpolation. It is certainly proper that his opinion be received with great deference. 2d. When possible, the meridian measures may and should be made differential at all the observatories, by invariably referring to the nearest bright star as a zero point of the heavens. If this be done, the value of the observations will probably be much enhanced.

"As the preceding series will occupy only a portion of the time that it is intended to pass in Chile, there may be various shades of opinion respecting the subjects of investigation most desirable, or most likely to produce valuable scientific fruits, and with which we shall employ ourselves at intermediate intervals; but it will probably be admitted by all, that the following cannot fail to be useful if the observations are successfully made.

"1st. Meridian observations of the moon, both in declination and right ascension; the former with a view, more particularly, to the improvement of the constant of lunar parallax, and the latter, in combination with the culminating stars, for the longitude of the station. To verify Burckhardt's semi-diameter, both limbs will be observed whenever practicable, out of and on the meridian, at opposition, and near conjunction. The limited assistance asked for will not permit these observations to be made when the moon passes the meridian later than 1 A. M., except during the oppositions of Mars and western stationary terms of Venus.

"2d. Meridian observations of the smaller planets when they culminate within one hour of any observation previously enumerated, and not later than 1 A. M.

"3d. Lunar occultations that occur before 1 A. M., except such as may be visible to the northern observatories also. These will be observed whatever the hour.

"4th. A catalogue of the stars between the south pole and 30° of south declination to the eighth magnitude, inclusive. I propose to devote at least three hours of every clear night to this work, and to obtain not less than three observations of each star, every zone to embrace as many previously observed stars as possible. The latter will serve as points of reference. It is not intended to rely wholly on these, but to ascertain the nadir point of the circle before and after each series, and clamp the instrument to the altitude of the centre of the belt to be examined, using only the micrometer screw for determining differences of declination. Supposing that a zone of 40′ in declination by three hours in right ascension may be swept every favorable night, if we allow a loss of one third for cloudy weather and overlapping, it will still be possible to sweep the 60° in three years.

"5th. It has been suggested that much information respecting terrestrial refractions would be

derivable from a comparison of observations made at observatories in opposite hemispheres (north and south) on the circum-zenith stars of each other, each observatory to determine also the absolute places of the same stars. I therefore propose to observe most carefully the declinations of α Columbæ, β Columbæ, θ Centauri and λ Scorpii, and the zenith distances of β Persei, 12 Canum Ven., η Herculis, α Lyræ, and 67 Cygni.

"6th. Observations of comets. For the reason assigned with reference to observations after 1 A. M., it cannot be expected that we shall devote much time to searches for these bodies, however desirable it might be under the serene atmosphere of Chile. They will, however, be observed whenever discovered in the course of other observations or at periodic returns.

"7th. Magnetic observations. On one day of every month—the *term-day* of such observatories as continue to keep it—I propose to determine the three elements of the earth's magnetic condition, viz: its declination, inclination, and the intensity of the directive force. To verify the law of diurnal fluctuations of the angle which the directive force makes with the true meridian, observations with the declinometer will, occasionally, be continued throughout the *term-day*. Neither the appropriation granted by Congress, nor the aid asked for, will justify any extension of these observations; but, if suggested, modifications of times or methods will be cheerfully conformed to.

"8th. Meteorological observations. A register will of course be kept, and it is proposed that it shall embrace a record of the indications of barometer, dry, wet, radiating, and registering thermometers, wind-vane, clouds and rain-gauge; the records to be made at 9 A. M. and 3 and 9 P. M., or such other hours as will furnish results from which the mean and extremes of the Chilean climate may be more satisfactorily derived. To determine the local law of daily variations fully, it is in contemplation to make hourly observations on equinoctial and solsticial term-days during our whole residence.

"9th. There is one other phenomenon connected with the physical constitution of our globe which the residence of the Expedition may offer opportunity to investigate. I mean the terrible convulsions that its crust is in many places subject to, and to which the very locality we shall occupy has been so frequently and so fatally liable—earthquakes! It is therefore submitted, whether any and what form of seismometer shall constitute a part of our equipment.

"These nine classes or series of observations embrace as great an amount of labor as it will be prudent for two observers to undertake, and even its accomplishment must of necessity leave all reductions until after the return of the Expedition to the United States; but (whilst I disclaim knowledge of nearly all branches of natural history) as so little has been learned of the immediate country we shall probably select—if the collection of specimens at leisure hours, remarks concerning the flowering of plants, the migration of birds, or other designated phenomena, would be useful from one so unskilled—the enterprise is embarked upon with a full determination to gather every scientific fruit that may be offered.

"The various observations actually required, and those which it appears proper to make, having each been enumerated, I proceed to specify the instruments absolutely necessary for the purpose.

"*First.* A meridian circle. [Any construction of this instrument which will facilitate observations without impairing accuracy will be of the utmost consequence in an establishment so feebly manned. I therefore present for consideration that the circle be] at least 36 inches in diameter, reading to 1″ by means of four micrometer microscopes, and to be provided with a telescope of not less than 52 lines clear aperture. [The telescope to be constructed with a prismatic reflector at the centre of its transverse axis, so placed that rays of light from the object-glass will be reflected through the axis as a part of the telescope, and thus the observer will occupy the same position whatever may be the altitude of the observed object. At the same time, the telescope tube is to be made symmetrical, in order that the eye-tube, with its micrometers, may be placed as in the ordinary construction, should it be found expedient to remove the prism. A disc of metal or of wood, 39 inches in diameter, interposed between the observer

and circle, will cut off radiant heat; and the instrument should be mounted on stone piers. The eye-end should be fitted with two micrometer microscopes, the plate or diaphragm of that which moves vertically to carry not less than five equidistant horizontal wires. As this construction will permit a trough of mercury to remain always supported between the piers, the permanence of the nadir point may be tested after every observation without much loss of time, or the annoyance and unsteadiness when mounted on a tall ladder. Moreover, the observer remains constantly in the same natural and unrestrained position most conducive to accurate observations, and never risks disturbing his circle when rising. A reversing carriage and the basin of mercury will obviate any actual necessity for a level, and every eye-piece should be so constructed that it may be used in collimating.]

"I am not aware of any suitably-constructed circle unemployed which could be obtained for the Expedition, and consequently application was made to Messrs. Pistor & Martins, through the United States legation at Berlin, for an estimate of the time that will be required and the probable cost of such an instrument. In reply, these artists offer to complete one within nine months after the receipt of an order, for about $2,100. The fidelity with which they executed the transit instrument mounted in the prime-vertical of the Washington observatory, as well as their punctuality (to a day) in fulfilling their contract for its delivery, added to the character which the Pistor circle at the Berlin observatory has obtained for the senior partner, would induce me to give the order to these gentlemen, and leave all details to their known judgment and skill.

"*Second.* An achromatic telescope of about five feet focal length, and aperture of forty-eight lines, or thereabout. The instrument in view was purchased for the United States exploring expedition, and is mounted on a tripod stand. It will require alterations and additions to its mounting and equipment, as it is only furnished with annular and reticulated micrometers. I have no doubt that Mr. Young, of Philadelphia, can mount it as an equatorial satisfactorily, and would recommend that it be done in the simplest style, viz: that of the comet-searchers made at Munich by Mr. Merz. It will probably be necessary to send abroad for a filar-micrometer; and to facilitate differential measures with objects in distant parts of the field, it is intended that its movable diaphragm shall contain not less than five equidistant wires. A similar number of transverse wires will permit the instrument to be used as a transit in differences of right ascension.

"*Third.* A sidereal clock and three chronometers. The clock wanted was also purchased for the exploring expedition, and remains in charge of Commander Wilkes. Should he still have it in use, one must be purchased. One of the chronometers should be regulated to sidereal time, and another be of 'pocket' form.

"*Fourth.* A sextant and an artificial horizon.

"*Fifth.* A declinometer. The instrument referred to was used in the observations made on Capitol hill from 1840 to 1842, and is described in the volume of magnetical and meteorological observations published in 1845 by order of the Senate U. S. It will require slight modifications to render it more effective, which may be made by any ordinarily good mechanician.

"*Sixth.* A Fox's deflector. There is one of these instruments, not in use, at the Washington observatory. Prof. Bache informs me that it is seriously defective in its pivots or jewelled holes, or both, and requires thorough examination and repair. This, I have ascertained, may be done properly in New York.

"*Seventh.* A standard and two mountain barometers. The former should be of Newman's or Pistor's construction, and all of them carefully compared with the standard of the Washington observatory.

"*Eighth.* Thermometers. There will be required two standards; six common instruments, divided to single degrees from $-10°$ to $+120°$; two pairs of Rutherford's self-registering; two terrestrial and two solar radiating, and two wet-bulb. The scales of the last should be

equal in each division to 0°.2, and extend from 20° to 90°. They will all be compared with the standard.

"*Ninth.* A wind-vane.

"*Tenth.* A rain-gauge.

"*Eleventh.* A seismometer.

"The following books also are necessary:

"Nautical Almanacs, British Association Catalogue of Stars, Lacaille's Catalogue of Stars, Johnson's Catalogue of Stars, Madras Observations, Cape of Good Hope Observations, Tables of Logarithms, Penny Cyclopedia, &c.

"To avoid delay on arrival at the station which may be selected, as well as the risk of obtaining suitable materials or workmen, it is proposed to build the observatory and prepare the piers for the circle in the United States. The building should be at least twenty-two feet long, eighteen feet wide, and eighteen feet high from the ground to the eaves, its floor to be elevated two feet above the surface. The east and west doors will require to be wide and high enough for the stand of the equatorial to pass freely through, and the meridian apertures should not be less than twenty inches wide. Its frame may be of yellow, and the weather-boarding of thoroughly seasoned white pine, thick enough to permit being fitted together with tongues and grooves not less than half an inch square, and in sections of ten feet by four and a half. These sections are to be fastened to the studs and rafters with stout screws, and every part is to be so marked that the house may be put together in a few hours after the piers are in their places.

"The roof doors will be opened from the inside; and should it be found necessary, a revolving parallelogram of iron, described by Struve in No. 458 *Astron. Nach.*, will be secured to the ridge-pole on either side of the meridian aperture to hold the house together; but I am not sure that it will not be less liable to injury in an earthquake country without this addition. A box of lattice-work will be made on one side for the thermometers; and to prevent action of the direct rays of the sun during the mornings and afternoons of summer, venetian blinds will be erected at the distance of three or four feet to serve as screens. Such a house can be erected by two persons in a few weeks, and, if finished in the best manner, will cost five hundred dollars. When taken to pieces, it can be packed for transportation in a small compass.

"The artist selected to construct the meridian circle should be requested to prepare drawings of the piers that will be required, observing, on account of the possible land transportation, to plan them of the smallest practicable dimensions. Sending these drawings to the United States without delay, the piers should be split from the same granite boulder, and dressed and properly boxed at the port from which it is intended to embark the observatory and instruments.

"It is desirable that the whole equipment be despatched under care of the assistant by the 1st of June, 1849, to the port of Concepcion or Valparaiso, from either of which it may be forwarded in a coasting vessel to the point nearest to its final destination. I propose to leave the United States at the same time, cross the isthmus of Panama, and take the steamer which leaves there, monthly, for Valparaiso, where I shall arrive in about forty-five days. This will enable me to examine for the most suitable station between Santiago and Concepcion, and make all necessary arrangements prior to the arrival of the instruments.

"There appears to be no doubt that an inland station will be preferable to one on the coast, because the number of rainy and hazy days is much influenced by the vicinity of the ocean; but it is not possible at this distance to obtain the positive information to justify the selection of a station prior to examination. From all that it has been possible to collect, one of the interior towns on the rivers Maule or Biobio, just to the eastward of the seventy-second meridian, and south of the thirty-sixth parallel, will most probably be chosen, there being harbors at the mouth of each, and boat navigation which will permit us to transport the equipment with safety and facility."

The preceding programme was first presented to the American Philosophical Society, and by it referred to the committee which had made the report already quoted. Subsequently it was

discussed by Professors Benjamin Peirce, Joseph Lovering, William C. and G. P. Bond, and Lieut. Chas. H. Davis, U. S. N.—a committee appointed by the president of the Academy of Arts and Sciences; and, finally, the two committees met at Philadelphia in joint conference. There being differences of opinion respecting those portions embraced within the [ ], it was mutually agreed to omit them. The remaining portions being fully approved, were recommended for the adoption of the honorable Secretary of the Navy; the committee also submitting to him that three assistants should be allowed, instead of only one, as I had proposed.

Approved by the department, and the necessary authority granted me to proceed in the premises, Messrs. Pistor & Martins were at once requested to construct a meridian circle, my only stipulations being, that the divided limb should be full thirty-six inches in diameter and read by four micrometers to spaces at least as minute as 1″, and that the telescope should have a clear aperture of fifty-one lines. It was suggested, among many other points, that the tube of the telescope should be quite as conical as that of the transit instrument at the Washington observatory; that there should be two systems of micrometer wires at its eye-end susceptible of illumination on a dark field, as well as in the ordinary mode of being made visible by lighting the field through the transverse axis; that the level should be made with a reserve chamber; and that the counterpoises should be so arranged that it would not be necessary to remove them for reversal of the instrument; but the weight of metal in the circles, the number of radii, length of transverse axis, diameter of pivots, and all other details not specified, were left entirely to their discretion and judgment. Indeed, except as to the two given dimensions, I desired them to regard all the remainder of the instructions as indications of my wishes, which were not to be considered as positive directions when they conflicted with any better known mode of construction. Subsequently, Mr. Schumacher kindly consented to counsel the artists for me, and they referred to him whenever they sought authority, instead of waiting until letters could cross the ocean, and a reply reach Central Europe.

The order was received on the 26th October, during the temporary absence of Mr. Martins, and on the 31st July following a letter was written to me by our accomplished secretary of legation, Theo. S. Fay, Esq., saying: "I have one moment, before we close our despatches, to acknowledge your kind favor of the 16th ultimo, and to communicate the excellent news that your beautiful instrument is entirely completed, and stands in a perfection unrivalled. I have just been to see it; and though my opinion of the manner in which Pistor & Martins have executed their task would not be worth much in a *scientific* point of view, it will *go better* when backed by that of Encke, who has fallen in love with it, after a careful examination. I must say, if you discover a new sphere in the heavens, the least you can do is to call it 'Pistor & Martins!' for their punctuality has equalled their skill." I will leave the distinguished Berlin astronomer to express his own opinion of the instrument in another place, (Introduction to Vol. 4), but feel it due to these skilled and faithful artists to add here, that the circle ordered differed so greatly in construction and cost from the one they had sent me an estimate for, it was necessary to write for additional authority subsequent to the letter of September 26, and this authority did not reach them until January. Yet, so determined were they to fulfil their pledge, and not disappoint me, that workmen were employed to relieve each other, and, as promised, the instrument progressed to completion within the nine months—day and night! Would that all were alike punctual!

It will have been perceived that the contemplated form—to place a prism at the centre of the transverse axis, so as to throw the pencil of rays from the object-glass through one of the pivots—was departed from in the order for the circle. This was out of deference to the opinions of American astronomers, who thought it would be a great risk to be wholly dependent on an instrument of untried construction, in a country where it would be difficult, if not impossible, to remedy defects. Eminent artists in Europe thought it would possess extraordinary advantages, and the astronomers who wrote to me considered it certainly much more efficient for a single observer than the ordinary one—so much so, that, were they ordering for themselves, they

would assuredly adopt it. The experience of two and a half years in zone observations fully convinced me that the diagonal telescope would have enabled us to do more and far better work with infinitely less physical effort, and on another occasion I would not hesitate to have such a transit-circle made.

Applications were next made to the observatory, and to Commander Wilkes, U. S. N., for the other instruments belonging to government named in the preceding pages, and with which it was supposed they could furnish the Expedition, and the five-feet telescope, sidereal clock, chronometers, Fox's deflector, barometers, and thermometers, were at once transferred—Lieut. Maury offering to facilitate our equipment in any manner within his power which might be indicated to him. The first named instrument had long occupied a position subject to the extremes of temperature and moisture, without frequent attention, and careful examination showed it to have been seriously, if not fatally, injured. An annulus of oxidation, more than one and a half inches in diameter, had formed on its object-glass, irremovable unless by repolishing—a process which might destroy its figure; Fox's deflector was probably injured beyond the skill of any one but the original maker; and the declinometer had just been given to a mixed commission of army and navy officers about to embark for duty in California. In this unexpected dilemma, with nearly one half of the appropriation by Congress already pledged for the circle, (3,400 rix thalers,) and the unavoidable expenditure of quite a thousand dollars more of it for the observatory, piers, and repairs, I scarcely knew where to turn for relief. Prof. Henry, Secretary of the Smithsonian Institution, had very generously offered to lend me a seismometer, and a complete meteorological outfit, in case the observatory could not supply it, and subsequently authorized me to purchase, at the expense of the institution, a full set of the portable instruments used in magnetic surveys. Moreover, the department had sanctioned the recommendation of the joint committee respecting the number of assistants; American astronomers thought the five-feet telescope altogether too powerless; and each day had added to my own solicitude, that every portion of the equipment should be the best of its kind. The circle would be so; an achromatic telescope, of six and a half inches aperture, parallactically mounted, and driven by clock-work, would be a suitable companion for it; and should we prove fortunate in inspiring the government and people of the country where we were to be located with a desire to promote astronomy, the two instruments would do honor to a national observatory. But where and how was such an instrument to be obtained?

Looking over the programme of organization of the Smithsonian Institution, I found that it proposes—"Also a collection of instruments of research in all branches of experimental science;" and as such an instrument is within the limits of portability, and might be used* in obtaining astronomical data in our own as well as in other countries, I supposed that it would be a most valuable, if not an absolutely necessary accession to the cabinet—one whose possession would enable the Regents to stimulate original researches to the solution of experimental problems. It was therefore suggested to Prof. Henry, that he could render great service to science, if he would obtain one somewhat in anticipation of the time proposed in their programme, and lend it for our use. At that time one half of the income of the institution was applicable to current expenses; the other half was required to be appropriated for the building in progress, and the amount demanded for the single instrument was a serious obstacle. But that accomplished physicist, as well as the members of the Executive Committee of the institution, was greatly interested for the Expedition, and, after much discussion, he notified me that it was deemed of sufficient importance to astronomical science to aid me in the manner requested, provided the telescope could be obtained on a credit of three years, and at a cost not exceeding $2,000, with interest. No importer to whom application was made was willing to order one from Germany on such terms. Messrs. Merz, the successors to Frauenhofer, at first declined selling without the cash—indeed their ordinary custom is to demand one half of the price in advance; and the only maker in the United States likely to execute properly the mechanical portions of so large

* If constructed with a suitable range of adjustment of the polar axis.

an instrument refused to accept the order. Just when I had made arrangements to borrow, on my own account, the sum charged by Messrs. Merz, and import an equatorial from them, Prof. Henry authorized me to increase the offer to Mr. Young, of Philadelphia, and eventually a contract was concluded with him, on behalf of the Smithsonian Institution—the right being reserved to me to procure the object-glass and micrometer from such artists as might be preferred.

About this time, notice was published in *Silliman's Journal*, by Mr. Rutherford, of the performance of an object-glass made from imported materials by Mr. Henry Fitz, an optician at New York. Learning that several other lenses had been perfected by the same artist, I determined to examine them all, and then confer with Messrs. Bache, Peirce, and Walker. To be brief, the examination and conference resulted in an order to Fitz to grind a lens from Guinand's glass, to be of the same diameter (six French inches) as that of the telescope at the High School observatory, in Philadelphia, and to forward it to Prof. Kendall. If he, and other competent and impartial judges, should pronounce it as good, *in every respect*, as the High School lens, it would be purchased at the Munich price—$500. If inferior, we should have the right to retain and use it, free of cost, until another could be imported from Bavaria.

Between the date of the order, November 27, and the time that the tube was ready, April 15, 1849, Mr. Fitz prepared three lenses of that size. Veins developed themselves in one only after it had been polished, and a second proved scarcely less objectionable in its crystallization. Of the third submitted for trial, Prof. Kendall wrote me, May 1: "I had the pleasure of making trial of the Fitz object-glass last evening, and was highly gratified with the result. I compared it with ours upon the moon, Jupiter, several double stars, and the bright star Vega, with its companion, using a variety of powers, and it is my opinion that Mr. Fitz has fully accomplished all that he undertook to perform. From this trial I am unable to pronounce which is the better glass. The Frauenhofer did nothing which was not as well done by the Fitz glass. There was only one point about which there arose a doubt, viz: color. On first looking at Jupiter, through the new glass, I thought there was rather too much violet about the edge; but on applying the other object-glass, with the same eye-piece, I could not discover any improvement but that which might justly be attributed to an improved state of the atmosphere. Mr. Fitz, Mr. Longstreth, and Mr. Young, with one or two other competent persons, made a comparison of the two glasses on Sunday evening also. I was not aware of their intention until yesterday morning. Mr. Young was with me last evening, and perfectly coincided with me in what I have said above. I called to see Mr. Longstreth and one of the other gentlemen this morning, and found that each had arrived at the same conclusion as myself in regard to the merits of Mr. Fitz. Indeed, we are all delighted with his success; and I am fully persuaded that between this and one you might order from Merz, the chances would be decidedly in favor of the former."

Gratification is a feeble word to express my pleasure at the success of the American optician, for I could not but think this first *Yankee* telescope of considerable size marked an era in the progress of mechanical science in our country, for which I hoped future astronomers would render due credit to the Expedition. That Mr. Fitz was thoroughly competent to figure and polish, I was fully convinced, on examining the object-glasses previously made, and my only regret was, that he could not forthwith undertake the whole task, and begin by manufacturing his own glass. But he had genius, and nothing would be more likely to stimulate him to undertake it than the success just met with.

Thus, through the assistance of others, the Expedition would be most efficiently equipped, and the support of the Smithsonian Institution, at a very trying period, will always be remembered with the sincerest gratitude. But this very assistance placed us in a difficult position. The Expedition was national; the mass of means (instruments) furnished to obtain its ends had been by a corporation founded by individual munificence to perpetuate his own name, whilst increasing and diffusing knowlege among men. Whose should be the credit of our results? Were the observations with one portion of the instruments to be submitted to Congress, and those with the other to the Board of Regents, to be issued as "Smithsonian Contributions?"

Clearly, if the government demanded all, and the instruments named in the proposition submitted to Congress were unsuited, or had been disposed of on other public service whilst the subject was in abeyance, should the objects of the Expedition be worth striving for, as had already been decided by the national legislature, it was the duty of that honorable body to supply the means by which success could be obtained, and not permit the funds of a private institution to be trespassed on. There are multitudinous interesting subjects pursued by individuals, which can only be investigated under the patronage of such bodies as the Board of Regents, or learned societies, and twice the funds at the control of the Smithsonian Institution could be thus expended every year. These were legitimate claimants for its fostering help—we were not. On representation of the facts to the Naval Committee at the assembling of Congress, the views of the Hon. F. P. Stanton were sustained, an additional appropriation of $6,400 was granted to cover costs of all the instruments ordered, and the Smithsonian Institution was absolved from the responsibility it had so nobly assumed in our behalf.

Everything was now progressing satisfactorily. Much interest had been manifested for the Expedition in England, as well as on the continent, and most valuable services were rendered by Admiral Beaufort, Col. Sabine, Capt. (now Rear Admiral) W. H. Smyth, and others, by their counsel, by obtaining useful materials for us, and by offers to facilitate our objects at all times wherever we might be. So earnest were the desires to do something, that inquiry was made whether the British admiral, or the consuls on the coast of the Pacific, could aid us at any time? These offers were dictated by a principle of generosity noble in the individual, as it was honorable to the nation whose service they adorned, and I could only regret that the acknowledgments of the Navy Department for these tokens of good will could not have been communicated to these gentlemen by one whose pen would better have done justice to the sentiments inspired. But I was sure all of them would remember, that education on shipboard, unlike that of a court in the inculcation of well-rounded and elegant, yet meaningless diction, insensibly promotes frankness and cordiality—rarely results in insincerity. Therefore, they would appreciate me in a simple expression of profound gratitude, and believe my assurance, that we should at all times esteem it a privilege to render aid to any of the numerous scientific or other parties England so magnanimously sends abroad for the benefit of mankind.

Under the direction of Col. Sabine, R. A., the magnetical, and a portion of the meteorological instruments were rapidly advancing. Prof. Forbes, of Edinburgh, had undertaken to order and supervise the seismometer; Mr. Schumacher and Theodore S. Fay, Esq., wrote encouraging information respecting the meridian circle, and the remaining instruments, to be completed under my own charge, were in such a state of forwardness that our departure need not be delayed beyond the 1st of June, if a suitable conveyance could be obtained. There remained then only to construct the observatories, select assistants, and prepare a circular stating the plan of operations, and inviting the co-operation of other astronomers.

The purchase of a larger telescope rendered modification of the building necessary, and the circular observatory subsequently described in this volume was devised for it in addition to the rectangular building previously mentioned. Both were put up in Washington under my own immediate supervision, and when found fully adequate to our wants, each piece was indelibly marked, and the whole taken down and arranged in small packages suitable for transportation. They were constructed with screws instead of nails.

The department had detailed Passed Midshipman (now Lieutenant) Archibald MacRae and Henry C. Hunter, volunteers for the service, as assistants, authorizing me to appoint as captain's clerk Mr. Edmund R. Smith, a young gentleman who had just graduated at the Georgetown college. As it was desirable that the first two named should obtain knowledge of instruments and observations before leaving the United States, they reported to me at Washington, and Lieutenant Maury, the Superintendent of the Observatory, very kindly permitted them to assist there under instruction of the officers on duty in that establishment. At the same time, they were employed to make selections of stars from all published catalogues and Bessel's Zones,

suitable for the ephemerides of Mars and Venus, reducing the catalogue places to the 1st of January of the year for which each ephemeris was prepared. As the apparent orbits crossed several portions of the heavens in which no stars had previously been observed, at my request, both Lieutenant Maury and Professor Bond, at Cambridge, Mass., caused sweeps to be made, to obtain, if possible, suitable comparing stars. These places, together with those of the planets, were plotted on charts, and lithographed copies were sent with the ephemerides to every observatory. The accompanying circular was as follows:

TO THE FRIENDS OF ASTRONOMICAL SCIENCE.

In the year 1847 Dr. Gerling, of Marburg, suggested that a new determination of the solar parallax might be obtained by observations upon Venus at and near her stationary periods, provided these observations be made at points far removed from each other.

In 1847–8 the American Philosophical Society and the Academy of Arts and Sciences recommended to the Secretary of the Navy that an astronomical expedition be sent to Chile, for the purpose of making, according to Dr. Gerling's plan, observations upon Venus, in connexion with the National Observatory at Washington.

By an act of Congress, approved August 3, 1848, the Secretary of the Navy was directed to cause these observations to be made.

Being thus authorized by the national legislature, and that nothing which is calculated to impart interest to the undertaking or to give value to its results may be omitted on the part of the American government, I am directed by the Hon. Wm. Ballard Preston, Secretary of the Navy, to announce to the friends of science the objects and plan of the Expedition, and to invite astronomers generally to lend it their co-operation by making, in so far as it may be practicable and convenient for them to make, a series of corresponding observations.

The Expedition has been fitted out on a scale commensurate with the objects in view. All the means and facilities for it which Congress has placed at the disposal of the Executive have been afforded to it by the Secretary of the Navy. Reposing special trust and confidence in the zeal and ability of Lieut. J. M. Gilliss, U. S. N., he has appointed that officer to the charge of it; other officers of the navy have been detailed to accompany it as assistants. Passed Midshipmen A. MacRae and Henry C. Hunter, who are to accompany it, have been stationed at the National Observatory for the requisite and previous training. The necessary instruments have been procured for the Expedition, and suitable buildings to serve as an observatory in Chile have been prepared in Washington. They are wooden structures, and will be taken to pieces and shipped to Valparaiso in the course of a few days.

The principal instruments which the Expedition will carry with it are two telescopes equatorially mounted, a meridian circle, a clock, and three chronometers.

The larger telescope is an eight and a half feet refractor. It has an object-glass by Fitz, of New York, that affords a clear aperture of six inches and a half. It is fitted with clock-work by Wm. Young, of Philadelphia, and by him provided with a micrometer adapted both for differential measurements and for measurements of angle of position and distance.

The other telescope is a five-feet achromatic, by Frauenhofer. It, also, has been equatorially mounted and fitted with a micrometer by Young, of Philadelphia.

The meridian circle is by Pistor & Martins. The object-glass of the telescope has an aperture (clear) of four and one third inches, with a focal length of six feet. The circles are thirty-six inches diameter, minutely divided, and provided each with two reading microscopes.

The series of astronomical observations, in which the co-operation of other observers is more especially invited, will consist of differential measurements during certain portions of the years 1849, '50, '51, and '52 upon Venus and Mars, with certain stars along their paths.

The observations upon Venus which will most command the attention of the Expedition, will be differential measurements upon that planet in the morning and evening while it is near the inferior conjunctions of 1850 and 1852.

In like manner, Mars will be compared with its neighboring stars near the times of opposition of that planet in 1849 and 1852. The object of these observations upon this planet is a more accurate determination of its parallax.

To facilitate the observations, and to secure concert of action, so that the co-operators, in whatever part of the world, may, in observing the planets, always use the same stars of comparison, Lieut. Gilliss has prepared the accompanying charts and tables:

Charts Nos. 1 to 5, inclusive, refer to Venus; 6 and 7 to Mars. They show the approximate places of the planets from day to day relatively to the stars down to the tenth magnitude near their paths.

In some parts of the paths of the planets, along which published catalogues do not afford proper stars of comparison, special observations have been made with the large refractor of the National Observatory; the stars whose approximate places have been thus obtained are mapped down along the planet's path.

Tables 1 and 2 contain the ephemeris of the planets and stars of comparison. They give the star of comparison for each day, and quote its magnitude, with its approximate mean place only.

The stars marked W. C. are from the unpublished observations of the Washington catalogue; as they have not undergone their final reductions, their declinations are only given to the nearest 10″. The other stars are designated by the initials or name of the catalogue from which they are taken.

In the ephemerides of the two planets and their neighboring stars, the mean places of the stars for 1st January of the year for which the ephemerides are calculated, are given. The object of such ephemeris is to give the place of the star with accuracy sufficient merely to leave no doubt as to the identity of the particular star which all observers are requested to use during the day thereby provided for.

It is requested that those who may have the goodness to co-operate in these observations will observe the planets also, both for right ascension and declination at their meridian passage.

The order of observations proposed by Lieut. Gilliss is this: During the term of the ephemeris of Mars, differential measurements upon that planet and the star of comparison for the day will be commenced at two hours after the passage of the planet across the meridian of Greenwich, and be continued for one hour and a half after the star and planet shall have passed the meridian of Washington, observing and comparing with the star the north and south limbs of the planet alternately.

Both the planet and its star of comparison will also be observed, with the meridian circle, at their transits across the meridian of the observatory in Chile.

The same course is proposed to be pursued at meridian transit with regard to Venus and her stars of comparison.

Lieut. Gilliss proposes to commence the differential observations upon Venus and her star of comparison as given in the ephemeris as early in the evening and morning, and to continue them as long, as the light of the sun and the conditions of the atmosphere may admit. Owing to the absence of stars of sufficient magnitude within 15° of the sun, an omission is made in the ephemeris during the time that the planet will be within that distance of the sun. It is proposed during such intervals to rely exclusively on meridian observations, both at the observatory in Chile and elsewhere.

The precise place at which the observatory is to be erected will not be decided upon until the arrival there of the Expedition.

Those astronomers who are disposed to forward the objects of the Expedition so far as to co-operate with it in conducting an auxiliary series of observations, will perceive that the results of their labors will be enhanced by using, whenever practicable, the stars of comparison which Lieut. Gilliss has selected, and which are given in tables 1 and 2, and by following generally the plan of observations proposed by him, and herein explained.

Each co-laborer is requested to send annually to the Superintendent of the National Observatory at Washington his observations, with an account of the instruments with which they were made, together with such other information in relation thereto as is necessary to a full understanding and appreciation of them, and the results arising therefrom.

M. F. MAURY,
Lieut. U. S. Navy.

June, 1849.

In June, the observatories and all the instruments, except the meridian circle, were shipped at Baltimore on board the "Louis Philippe," bound round Cape Horn, and the vessel being ready for sea, the assistants embarked on the 11th of the following month. I hoped to reach Valparaiso before them, and supposing that no detention would be experienced on the more expeditious route across the isthmus of Panama, none of the portable instruments were reserved except an aneroid barometer and one thermometer. As it resulted, the magnetical instruments would have been an instructive and interesting source of occupation during the weary month passed in that most irksome of all cities on the globe—Panama. But I am anticipating.

On the day following the departure of the assistants, the department was notified of the fact, and advised that there would be nothing to delay my departure beyond the date at which the next steamer would leave for Chagres. And three weeks later the following instructions were received:

Navy Department,
August 6, 1849.

Sir: Your letter of the 12th ultimo, informing the department that the instruments and other portions of the equipment essential to the observations to be made under the act of Congress approved August 3, 1848, have been shipped for Chile under charge of the assistants, and that nothing need now delay your departure, has been received.

You will be pleased to embark by the earliest opportunity, and proceed to Santiago in Chile, via the isthmus of Panama, and the line of steamers from thence to Valparaiso. On your arrival, you will make known to the consul of the United States there, or other accredited agent of the United States, the object of the Expedition, and request him to make the proper representation to the Chilean government, with a view to obtain the necessary permission to occupy suitable sites for the observations. The object of the Expedition, as set forth in the act referred to, is to cause "the observations to be made which have been recently recommended (to the department) by the American Philosophical Society and the Academy of Arts and Sciences," of which you have been apprized. After obtaining the necessary permission of the Chilean government, you will select such sites as may be, in your judgment, necessary for effecting and completing the observations contemplated, and proceed without delay to accomplish the object.

For the pay of yourself and party whilst in Chile, Messrs. Baring Brothers & Co., of London, have been instructed to honor your drafts. You will keep an exact account of all your receipts and expenditures of public money, taking regular vouchers for all expenditures, sending your accounts quarterly to the Fourth Auditor for adjustment.

The unexpended balance of the appropriations amounts to $4,159 51, which will be placed in your hands, and charged to you on the books of the Treasury Department.

The department entertains the fullest confidence, that in your ability, zeal and energy, the honorable duty assigned to you will redound to the advance of science, and of the honor of your country and of yourself.

You will be pleased, from time to time, as opportunities offer, to inform the department of the progress made, and to furnish any other information of a useful character.

Wishing you success, and the safe return of yourself and party,

I am, respectfully, your obedient servant,

WM. BALLARD PRESTON.

Lieut. J. M. Gilliss, *U. S. Navy, Washington.*

As the two series of observations for parallax—the specific object which had been the origin of the Expedition—would be valuable only when there were corresponding observations in the two hemispheres, and the co-operation of other observatories would be matters of favor, not right, in order to insure the impartial trial of Dr. Gerling's method, under date of August 11, Lieut. Maury was instructed by the honorable Secretary, that—

"As the success of the Astronomical Expedition to Chile, under the direction of Lieut. Gilliss, will greatly depend on the care with which the corresponding observations are made in the northern hemisphere, you will designate an assistant whose especial duty it shall be to make the observations at the times and in the manner specified in the 'Circular to the Friends of Science,' which you prepared under the direction of this department."

At the same time authority was granted me to dispose of the equipment at the completion of our service, in such manner as would be best for the public interest, and in case of continued illness, or other disability of either of the assistants, the commanding officers of the United States ships touching at Valparaiso were authorized to give me any volunteer officer in exchange. The duties required would be confining and trying, our probable place of abode somewhat expensive, and I was unwilling to obtain the services of any officer who would be able to reproach me for having taken him from the less arduous and more economical routine on shipboard. Every effort was made to obtain at least one additional assistant from the department, viz: the number that had been recommended by the societies. There were two young officers who were earnestly desirous to accompany us, one of whom, when the honorable Secretary objected on account of the small remainder of the appropriation, volunteered to bear his own travelling expenses, but the Secretary was inexorable.

The first steamer to leave was the "Empire City," at New York, advertised for 16th of August. It was to be her second voyage, and the agents assured me that she would make the run to Chagres in eight or eight and a half days. Had this been accomplished, there would have been ample time to cross the isthmus by noon of the 27th; but we were eleven and a third days in making the voyage, and in consequence, the steamer for the south Pacific had left Panama before we anchored at Chagres. Nevertheless, supposing that repairs or other casualty might have caused her detention, no time was lost in landing, and by midnight I was ascending the river Chagres in a canoe urged by four athletic natives. A delay of six hours, caused by a flood in the stream, prevented our reaching the city until forty-eight hours after leaving the "Empire City," when it was learned that speed had been of no avail; the British mail steamer had departed at her appointed time, and there was before me the certainty of passing the ensuing month on the isthmus. How the time was passed, has been narrated in Vol. 1. Nor need I repeat here more than the fact, that the southern terminus of my sea voyage, Valparaiso, was reached on the 25th of October. At that time the steamers of this line left each extremity only once per month; and as they landed passengers, mails, and freight at thirteen ports within the 3,100 miles of navigation, and delayed at one of them, Callao, no less than five days, the voyage occupied four weeks. By omitting the two ports in Ecuador—Buenaventura and Guyaquil—and Huanchaco and Casma, in Peru, and remaining only three days at Callao, it is now reduced to eighteen days. But if custom-house officials would grant necessary facilities, and not detain vessels all night when they chance to arrive after sunset, the new steamers would easily make the voyage in fifteen days. There is now a semi-monthly line; and so pacific are the winds and waves of that broad ocean, that the arrival of a steamer from a coasting voyage of a thousand miles may be calculated quite surely within a few hours.

Reaching Valparaiso bay late in the afternoon, a glance satisfied me that the "Louis Philippe" was not among the shipping in the port. Nor had the consignees any intelligence of her; but as she might be expected to arrive at any hour, no time was to be lost in preparatory measures. Whilst the consul, our highest representative functionary in the country at that time, was preparing for me a letter to the Minister for Foreign Affairs, all necessary information was obtained of the climate on the coast, and soon after night-fall I was *en route* for the capital. Besides

the orders from the Navy Department, I had brought a despatch to the former gentleman from the honorable Secretary of State, who also made known the objects of the Expedition; and in consequence, the consul placed me in direct intercourse with his excellency the Minister, as the most expeditious mode of perfecting the necessary arrangements.

By travelling all night, I was at Santiago near noon of the next day. On presenting my letters, the government received me cordially, and acted promptly and with commendable liberality on every point, by offers to place at my control any unoccupied public ground, to admit free of customs dues everything belonging to the officers of the Expedition, as well as its equipment, and to promote or facilitate its objects in every other manner which might be indicated. Indeed, the good will and liberality of the President and his Cabinet then, and throughout our stay in the country, were uniformly manifested. As one evidence of their desire to serve us, the Minister of War offered to station a guard at the observatory to protect the instruments from malicious injury, and ourselves from possible annoyance, requesting that notice might be sent to him as soon as the instruments were conveyed to the buildings. Unwilling to incur so great an obligation when there was no apparent necessity for it, the offer continued tacitly declined. Message after message came from the Colonel of Artillery, notifying me that he had *orders* to send a guard, and he awaited expression of our wishes—until, finding no reply was obtainable, but—"I will advise you when it becomes necessary," he sent a corporal with instructions to report to me. To have ordered the subordinate and his men back to the cuartel would have been a rude return for an act of evident kindness, and, consequently, a sentinel stood beside the observatory door summer and winter. As a patron of science, in stability of government and steadily progressive prosperity, Chile is far in advance of every other nation of South America.

A very brief investigation sufficed to satisfy me that no other part of the country would answer our purposes so well. In arriving at this conclusion, three conditions were weighed: 1st. Resources in case of accidental injury to instruments. 2d. Increased value of observations from the most southern station possible; and 3d. The atmosphere which would permit the greatest number of observations. The first was paramount, and as persons capable of making repairs could be found only at Santiago and Valparaiso, the advantage of a station nearer to the pole was thrown out of the question. Nor did decision between these two places require longer examination. Apart from the fact that the former city better satisfies the second condition, the climate of the coast is subject to frequent fogs and mists, from which the great plain is almost wholly exempt. Santiago, therefore, was chosen, much, I believe, to the gratification of the government.

This city, with a population of 90,000 souls, is situated on an elevated plain or basin, between ranges of mountains, in south latitude 33° 26′ 25″.9; approximate longitude west of Greenwich, 4*h*. 42*m*. 33.6*s*. The plain, or, more properly speaking, the succession of basins, on one of which it stands, commences about latitude 33° south, and with slight interruption, near the parallel of $34\frac{1}{2}$°, extends to the Gulf of Ancud, in latitude $41\frac{1}{2}$°. It varies in breadth from twelve to forty miles, and has a constant and quite uniform declivity from north to south. At Santiago the height is 1,830 feet above the sea; opposite Chilóe the plain slopes to the ocean level. The base of the nearest longitudinal range of the Andes is nine miles distant from the capital; that of the cordilleras to the west, not less than sixteen miles—the former attaining a height of 9,000, and the latter about 3,000 feet above the plain. One spur to the northeast, which is nearly 1,000 feet high, approaches the very skirts of the city; portions of the great Andine chain, less than thirty miles distant in an air-line, rise to 18,000 and 20,000 feet; and Tupungato to the east, and Aconcagua to the N.N.E., the loftiest known summits of America, are each more than 22,000 feet above the sea. Interrupting the eastern horizon, as does this giant cordillera, its interference with observations on the planet Venus in the morning twilight rendered so near an approach to it objectionable; but there was no locality in the vicinity of a proper residence free from the same obstacle, and no town in the interior that offered the facilities possessed by the capital.

Three localities there from which to select were offered me by government, viz: a part of the plain just without the southern suburbs; Cerro Blanco, a granitic knoll some 400 feet high, within the northern boundary; and Santa Lucia, a small mass of porphyry, in the eastern quarter of the city. The first is half submerged during the rainy season, and consequently, at such times, is almost inaccessible by pedestrians. It was without suitable accommodations near enough for our party. The second also would have rendered the erection of a dwelling indispensable.

Above the castles that occupy artificial terraces half way up its northern and southern slopes, Santa Lucia was but a pile of rugged rocks. But as government proposed to construct a suitable path to the vicinity of the summit, to level as much space there as might be required, and to furnish a room in the castle, should it be needed, serious obstacles to its selection were removed, and their liberal propositions respecting it were accepted. It was not until months afterwards, and when too late—when the noises and dust of the streets became serious annoyances—that it was ascertained how much better positions there are in Yungai—the western suburb. But, even then, one fact reconciled me to Santa Lucia. There, when bad weather prevented observations, as the assistants were surrounded by the best society, interludes of social visiting probably prevented the discontent which would have generated under arduous work in the isolation of Yungai.

On the very day that every preliminary had been finally arranged with the government, information came that the "Louis Philippe" had safely arrived at Valparaiso. Repairing there at once, within three days the observatories and instruments, packed in and on six of the huge ox-carts of the country, were on their way to Santiago. The distance from Valparaiso by the road is eighty-four miles; and as there are two ranges of mountains to cross, a journey in the summer ordinarily occupies loaded carts five days; so that it was the 9th of November when our train halted at the foot of Santa Lucia. The chronometers, barometers, and other delicate instruments, were packed on springs before leaving the United States, but, for greater security, they were suspended from the roof of one cart, with controlling cords at the bottom of each box, to prevent too great lateral motion. Having witnessed their departure, under charge of a careful *capataz*,* for the purpose of estimating the probable security of this mode of conveyance, by inspection of the train on the road, Lieut. MacRae and myself remained a day behind, and we were the last to proceed to the scene of our future labors.

Santa Lucia is a solid mass of rock. Its horizontal projection is an oval, some 1,300 feet long from N.N.E. to S.S.W., and 500 feet in its greatest transverse diameter. Its highest pinnacles, 200 feet above the city, as well as many others, are columnar, and, at a little distance, closely resemble basalt. Some of them are vertical—a few are horizontal; most of them, as do also its strata, stand at every inclination towards the west, but not one of them dips to the east. The slope is tolerably regular from the summit to the north and south extremes, though that of the southern portion is the most abrupt and broken. Partially covered with decomposed rock and scanty vegetable mould, its eastern face has an inclination not differing greatly from 45°. The western is precipitous—a bare wall of nearly black porphyry, with occasional injected veins of quartz. This side forms the great quarry from which the city is supplied. On its northern ridge, houses have been built as far up as the base of a castle, to which a tolerably good winding road has been formed on artificial terraces cut in the eastern slope; but above the castle, that is, for two thirds of the whole height, the rocks rise vertically for nearly twenty feet, and further ascent towards the summit was (then) only to be accomplished by clambering from point to point. The most appropriate places we could obtain were just below the summit, on the same ridge, and a large number of men were at once set to work to level them. This was no inconsiderable undertaking. Surrounded, as is the hill, by many of the best dwellings of the capital, blasting is prohibited, and the process of breaking down rocks by heating and pouring water on their hot surfaces is a very slow one. The intervention of feast days, when labor is

* The person in charge of a train of carts, mules, or the vehicle in which one travels, is so called.

prohibited by the church, proved another source of delay; and it was not until December 5 that the first building was ready for its instrument. The terrace on which this stood is eight feet higher than that of the rectangular edifice for the meridian circle, and 175 feet above the running stream at the base of the hill. It commands an unobstructed view, except between S.S.W. and S.S.E., where rocky escarpments interfere for about 15° above the horizon.

On the following night the equatorial was mounted, and four days later, work was commenced with it on the planet Mars. During that season the weather was exceedingly favorable for observations. Of the fifty-two pre-appointed nights remaining of the series, there were only four when no observations could be made, and two others when a slight haze obscured the very minute comparing star in the illuminated telescope. Such continuous loss of rest, added to change from the moist climate of the ocean to the excessively dry one of Santiago, was so rapidly breaking down Lieut. MacRae, that, on the 18th December, I was glad to take advantage of the arrival of the meridian circle, and send him to Valparaiso to supervise its landing and packing for transportation.

After the equatorial was mounted, three or four weeks were consumed in putting together the other building—a time quite as long as was occupied in its original construction. Meanwhile we had obtained permanent quarters in the vicinity; the circle and clock piers were put up, and our magnetical and meteorological observations had been systematically commenced. Early in February the circle was ready for use; the first series on Mars had terminated, and zone observations were instituted, commencing at 85° south declination, and working towards the zenith on successive nights in belts 24′ wide, until compelled to return below again to connect in right ascension. Each night's work comprised observations of level, nadir point, collimation by reflection of the wires from mercury and standard stars before and after a zone extending through three to four hours in right ascension, so that we were always occupied from five to six, and sometimes more hours. Lieut. MacRae and myself devoted alternate nights to these observations, very rarely having relief by clouds until after April 21st. Indeed, between February 4th and that date—seventy-six nights—there were only four of them obscure. The rains of latter autumn and winter came none too soon for us.

Appreciating the advantages that mental culture gives to every individual, community, or nation, the government was early in manifesting a disposition to have its citizens profit by our residence among them. The minister at Washington had inquired whether it would be agreeable to facilitate the studies of some of their most advanced young men, and very shortly after the instruments were erected the application was renewed through the University. Earnestly hoping to increase the interest in our pursuits, the proposition was cordially assented to, and three gentlemen were appointed by the Minister of Public Instruction, who were paid a moderate income whilst devoting certain hours to the study of theoretical and practical astronomy. One was a professor of mathematics in the National Institute; the others prominent students of his class. Our books were at once placed at their disposal; explanations were given them at all times; opportunities afforded them to become familiar with the meridian circle, and the smaller equatorial was loaned for their exclusive use. This instrument was mounted by them under a movable building within the castle yard, to which they had access without interfering with our regular work. These gentlemen readily aided us in the magnetical and meteorological observations, and also on the *term-days*, or whenever sickness diminished the small number of our active party. For assistance at such times they merited our best thanks. Nor was it the government only who were interested that astronomical knowledge should be cultivated in Chile. When the equatorial was first mounted, night after night, scores of persons ascended the hill to see the wonderful "*maquina*," as they called the beautifully equipoised but apparently complex instrument; and as the observations on Mars did not commence until an hour or two after dark, the intermediate time was devoted to showing them some of the wonders of the heavens. All who came were admitted—men, women, and children, rich and poor; even the sentinel who stood with sabre beside the door was not slighted; and each in turn went away gratified, the

poor deferentially waiting until their more fortunate countrymen gave place within the building. Few at a time could enter; and irksome as it was to repeat the same explanations to half a dozen or more parties every evening during nearly three months, we cheerfully persevered, and perhaps with good effect. We had been told by acquaintances that the lower classes living on and near the base of the hill were men of vicious propensities, whom it would be hazardous to meet unarmed at a late hour of the night; but, to their credit be it said, we were never molested, even by a word, in the nearly three years during which we went up to and left the observatory at all hours. May not our civility, when they came desiring to see the telescope and the curious objects it displayed, have secured their good will? But the custom of opening the observatory to visiters gave rise to a report that we had come to Chile as expounders of astronomy. Our arrival and purposes had been duly published; but in a country where there are so few journals and so limited a circle of readers our position was not readily comprehended. Without exception, the foreigners who had previously settled among them came to accumulate, not to spend money, and the mass reasonably supposed we had a like object. Perhaps this contributed to make credible among large numbers that an astronomical class was to be formed, admission to which was earnestly sought by many of our evening visiters.

Passed Midshipman Hunter, injured by being thrown from a horse early in January, returned to the United States by the first public vessel, and in September following the vacancy was filled by Mr. S. L. Phelps, who took my place at the circle. All the subsequent zone observations were made by Lieut. MacRae and himself. In January, 1851, an accident to the micrometer-screw that moves its horizontal system of wires, made it necessary for the assistants to work jointly at the zones, and, as it was manifestly impossible for them to be up every night, as soon as the first series on Venus terminated, I devoted the alternate nights with the circle to examination of such of Lacaille's stars between our zenith and pole as had never been twice observed. Messrs. Pistor & Martins, however, sent us new screws with the least possible delay, and at the close of June we could work as before.*

Most of the several hundred errors which were detected in these months of examination, and subsequently, have already been announced in the pages of the "Astronomical Journal" and the "Monthly Notices of the Royal Astronomical Society."

From June to October, in which last month the series on Venus commenced, the weather proved more unfavorable for observations than in any year since that of 1827—so said intelligent citizens—and there were only one third of the nights suitable for zone work; but we were able to observe the moon and stars selected from published catalogues, quite one half the time. Between October 19 and February 10, 1851, differential measures of the planet and comparing star were made on fifty-one nights; and there were seventy-three meridian observations, at which time its diameter also was measured, and the absolute places of several standard stars observed, one or more of which occupied nearly the same parallel of declination. Owing to its very frequent tremulous or pulsatory motion in the evening twilight, the differential measures when approaching its eastern stationary terms were often found difficult, and rarely afforded much satisfaction. As example to the contrary, however, the following remarks on one evening may be quoted to show that reliable measures are not impossible:

"*November* 14. An extremely fine evening throughout. Both objects are defined with precision and move steadily. Except those marked 'tremulous' (1) and 'blurred,' (3) it would not have been possible for me to make better measures with so little difference between the times of transit, and so large an angle through which to move the micrometer screw."

There were twenty-seven measurements made between 22*h*. 58*m*. and 0*h*. 18*m*. sidereal time, the difference of right ascension at the first being 50*s*., and at the last 44.4*s*., and of declination at corresponding periods 1′ 50″ and 2′ 12″. But in the morning twilight the atmosphere was

* Again these distinguished artists merited earnest commendation, as well for the promptitude with which they delivered these delicate portions of the instrument to be forwarded to us by mail, as for their disinterestedness in declining to make any charge therefor.

tranquil, and generally so clear that measures could be continued long after daylight if the comparing star was so bright as seventh magnitude. Once I commenced when the planet was not more than 3° above the horizon, and, as has been stated in Vol. 1, there were several occasions when the cusps could be distinguished by the unassisted eye! Its twinkling some mornings was also quite notable; both the latter being facts in physical astronomy, or rather *atmospheric* astronomy, never yet witnessed from any observatory in the northern hemisphere known to me. But, favorably as the planet could be seen, and carefully as colored portions were looked for on several occasions, nothing like a spot was ever detected. The meridian observations were prosecuted except whilst the planet was within 5° of the sun, a screen of white cotton cloth completely protecting the circle from the sun's rays.

When the circle was again in thorough working order, I made a visit to the northern provinces, taking along the magnetical instruments, and determining the elements at five stations, one of them 3,700 feet above the level of the sea. This journey also afforded opportunity to collect many facts respecting the mineral resources and distribution of mines in those provinces, as well as other interesting information not generally known out of Chile. During the month and a half of my absence from Santiago, there was very little work done by the assistants. Clouds had been even more frequent than in the corresponding period of the preceding year, though rains had neither occurred so often nor continued so long.

Autumn proved almost as unfavorable for the zones; so that from the commencement of summer to the close of this season, we averaged, for the catalogue, only a little more than 800 stars per month. July of 1851 was, undoubtedly, the most unpropitious month of our residence in Chile. During the second series on Mars, comprising 93 days, between 16th December, 1851, and 15th March, 1852, I was more fortunate. About 2,000 differential measures were made on seventy-eight, and meridian observations on eighty nights, it having occurred on two occasions that the comparing star could not be seen through the haze hanging over the valley. Generally the atmosphere was so clear that the shades of color of portions of the planet could be perceived with great distinctness and satisfaction, even under quite bright illumination of the field. The following notes appended to the observations of February 26, will show something of the appreciation in which such nights are held. On that night the star of comparison was double; its companion, blue and of the twelfth magnitude, was some 19″ south and 6″ east.

"Neither finer night, better images, nor more satisfactory work, since the commencement of the series. The atmosphere is as steady as the earth itself, and so translucent, that not only is the companion seen distinctly under full illumination, but even its blue color is perceptible."

There were twenty-four measures on that evening, and I am quite sure the place of the planet will be given by them to within less than half a second of arc. In marked contrast are these notes to the observations on the evening of the 1st February.

"There were two sharp earthquakes, at an interval of 12*s*., about 6*h*. 12*m*. P. M., (nearly twelve hours before,) whose effect seems to have been to change the condition of the atmosphere. At one instant the planet and star are steady, but before half-way across the field are blurred and jumping in a most extraordinary manner. Therefore, the measures could not have been very good, even had there not been the additional difficulty of endeavoring to keep Mars on the fixed wire by means of the tangent screw, whilst the micrometer wire was moved to bisect the star. Thus, only one reading of the micrometer is given, the star being that number of revolutions to the north of the planet's limb."

Unfavorable as this appears to be, if we divide the thirty observations into four groups for comparison, the change of declination between the mean of the times for the two groups of the north limb differs from the change shown by the south 0″.234. Should other observatories have been equally fortunate, a discussion of the observations cannot fail to be of high interest, for it will probably forever decide the possibility of determining accurately the parallax of Mars from meridian or differential measurements. At the close of the series, at least three meridian

observations were made of those in our own, as well as of the comparing stars, in the ephemeris of the Nautical Almanac.

During all these fine nights the assistants were making up lost time with the circle, extending their nightly zones to the limit their vision would bear, and adding an average of more than a thousand stars to the catalogue each month. A part of their work at this period was in the 5° immediately surrounding the pole, which was observed in one belt, the slow motion of the stars permitting the circle to be moved through that space without the risk of losing any object. In order to insure this also, the same zone was observed on three successive nights, and after comparison of the several results, every star not recorded on each occasion was specially looked for. The circle was read for every star in the polar belts. One of the 9th magnitude was found which performed its entire revolution within the field of the telescope! When double, the differences of right ascension and declination, and the magnitudes and colors of the components, were noted. There were quite a number of these last which escaped the sweeps of that eminent observer, Sir John Herschel.

That our estimations of magnitudes might be comparable, Lieut. MacRae and myself had early referred to small and well-known stars of the British Association catalogue as standards, ascending or descending in the scale of brightness to the extreme magnitudes embraced in it. In like manner, the judgment of Mr. Phelps was based on Mr. MacRae's estimates. The smallest star visible in the telescope of the meridian circle, illuminated for ordinary work, and on good nights, was set down as 12th magnitude. Many of Lacaille's must have varied greatly since the date of his work, and not a few of them may probably have short periods. How many of the sixty, not perceptible by us when sought for, may only have been in the wane, remains for the decision of later astronomers. No doubt a part of these discrepancies may be due to erroneous entries in his observation books, and others to errors since made in the reduction of his work; but as the case now stands, we have ample data to show that the places of the stars contained in the catalogue (Lacaille's) published under the direction of the British Association are extraordinarily inaccurate. That many of the stars south of the zenith of Santiago are variable, is established by the fact that our observations embrace quite bright stars not contained in his zones; and one or two of those not visible when twice sought in the early months of the work, were subsequently observed near their proper places. But the variable star of the southern hemisphere which has most interest is η Argus. Taking into account the surrounding nebula, the contiguous clusters of stars, its color, and changes of brilliancy, there is probably no sidereal object more wonderful. From 1834 to 1838, during which Sir John was at the Cape, it never exceeded α Centauri in brightness, and at one time was "a good match with Fomalhaut." In 1677, Halley had rated it as low as a 4th magnitude; in 1751, Lacaille saw it a 2d; from 1811 to 1815, it had been considered a 4th again; and subsequently, and up to 1845, it had varied between a not very remarkable 1st and a small 2d. At the last named epoch it exceeded the lustre of Canopus, than which Sirius is the only star more brilliant in all the heavens. The following records are extracted from our note-books:

1850, *February* 9. A bright, clear night, and steady atmosphere. Comparing the brightest visible stars, they rank—Sirius, Canopus, η Argus, α Centauri. The yellowish-red light of η Argus is more marked than that of Mars.

February 13. η Argus apparently less bright than α Centauri.

March 31. η Argus is quite as bright as the two stars of α Centauri, and superior to all except Sirius and Canopus.

April 15. η Argus approaches the brilliancy of Canopus.*

April 18. Night cloudless, and without haze. After the observations, careful estimation placed η Argus quite equal with, if not superior in brightness to α Centauri. They were equidistant from the meridian.

* Letter to Hon. F. P. Stanton.

May 14. η Argus and α Centauri being at the same distance from the meridian, the former is considerably the brighter.

May 16. η Argus more brilliant than the two stars of α Centauri combined.

May 28. η Argus goes on increasing steadily. With the ruddiness of Aldebaran, its magnitude is only less than Canopus.* Its change since the close of October has been nearly, if not full half a magnitude.

June 3. To the unassisted eye the atmosphere is remarkably clear, the "coal sacks" of the *via lactea* being of startling blackness. η Argus and Arcturus have, approximately, the same color, and though the latter is rather ruddier, the former is considerably the brighter. When compared, they had about the same altitude.

July 5. η Argus is still as bright as the two stars of α Centauri.

July 25. η Argus as bright or brighter than the two of α Centauri.

July 28. η Argus is on the wane, and is now very little superior to α Centauri.†

1851, *May* 18. η Argus certainly not so bright as α Centauri.

December 28. η Argus quite as bright as α Centauri.

1852, *January* 22. η Argus no brighter than α Centauri.

May 10. η Argus continued fully as bright as the double star α Centauri as late as the 15th of March last. Some nights I would estimate it a shade brighter; but when the two were at equal distances from the meridian, it was often impossible to detect any difference with the eye. Since then it has sensibly diminished. It comes nearer to my recollection of Capella, as seen in the northern hemisphere, than any other star.‡

These are all the memoranda recorded, and they fully sustain the impression of Herschel, of a fitfully variable star, to an astonishing extent, with neither settled period nor regularity of progression for its minor fluctuations. The more important gradations of lustre, as those noticed only by Halley in 1677, and Mr. Burchell in 1811–15, occur but after long intervals. Since 1822, there have been annual watchers of its changes, and none have seen it smaller than a 2d magnitude star. That the astronomer of the northern hemisphere may appreciate the lustre of the binary system, (α Centauri), with which I so constantly compared it, α^1 Centauri neither exceeds γ, nor falls below μ Leonis, which is the more obscure of the two; α^2 is, as nearly as possible, equal with Antares or Spica, with the decided orange tinge of the former, rather than the silvery radiance of the latter. Lieut. MacRae, on one occasion, estimated them at 4th and 2d magnitudes respectively, whilst I put them up as high as 1 and 1.2, which is certainly nearer the fact, though neither of us ever considered α^2 so bright as β. As their distance never exceeded $12\frac{1}{2}''$§ during our stay in Chile, the unassisted eye did not separate them, and their combined light is, perhaps, one third greater than that of Arcturus.

Our time in Chile was rapidly drawing to a close. Before leaving it, I was desirous to learn something more of its people, topography, and agriculture; and as it was necessary to save my eyes for the series of observations on Venus, to commence about the close of May, I left Santiago for Talca, soon after terminating the observations on Mars. Almost incessant work during nearly a hundred successive nights, in a climate so dry as to open the joints of wood that had been baked in an oven at home, had left me quite destitute of energy—very Chilean in apathy. Provided by considerate friends against most of the discomforts of the road, and instructed by them in all useful matters, the month passed on horseback proved an effectual restorative. Within that time, I visited the third city of the republic in population; the battle-field of Loncomilla; descended the Maule in a boat as far as Constitucion on the sea, and re-ascended it to within fifteen miles of Talca; had an opportunity to see the principal towns in the most productive agricultural provinces, and entered the Andes along the banks of the Cachapual, as far as

* Letter to Lieut. C. H. Davis, U. S. N.

† Letter to Rear Admiral Wm. H. Smyth, R. N.

‡ Letter to Dr. C. L. Gerling.

§ At mean epochs, June 15, 1850, and 1852, the differences in right ascension were $11''.77$ and $11''.56$, and of declination $3''.25$ and $1''.33$; the former derived from twenty-four, and the latter from eight observations.

the mineral baths of Cauquenes. As, of necessity, the journey was to be very hurried, much accurate geographical knowledge was not to be expected, and no other instruments were taken along than a Bunten's barometer and one thermometer. But the excursion brought me in contact with gentlemen who had visited the sources of several rivers, when crossing different mountain chains, and their information has been used in compiling the maps of Vol. 1.

Very soon after my return, the government decided to establish a National Observatory, and official information of the fact was communicated by Prof. Domeyko, who had earnestly interested himself to this end, and who was requested to ascertain whether our equipment could be purchased. In such case he was authorized to make the necessary arrangements for the transfer at the termination of our work. This was most gratifying information, a happy result to one of the cherished objects of the Expedition, and congratulations were tendered the Professor, that his adopted country offered this new evidence of its intention to continue, as it always had been, the most liberal patron of science and arts among the southern republics. Having been invested by the honorable Secretary of the Navy with power to dispose of our outfit, the instruments and few books belonging to the United States were offered at the prices paid for them without after-costs for transportation. Piers, &c., and the observatory building—the latter presumed to have deteriorated, and therefore not so valuable as when new—it was proposed to have appraised by two competent mechanics. Had it been optional with me, these last would have been freely offered to the government as a slight return for the many services so cheerfully extended us, and the propriety of doing so was immediately submitted to the department. Unfortunately, the letter from the Hon. William A. Graham, then Secretary of the Navy, promptly acceding to the suggestion, did not reach me until the purchase had been effected, and I could take the responsibility to present only the necessary objects and furniture for carrying on the duties of the observatories, which had been obtained in Chile. When the basis of the negotiation was settled, Dr. Charles Moesta, a graduate of the University of Marburg, was appointed director of the new establishment, and immediately applied himself to acquire practical knowledge of the instruments. He already had acquaintance with portable astronomical and magnetical instruments before leaving Germany, and for more than a year preceding this appointment, had filled the post of assistant to the chief of the Topographical Survey in Chile; so that two months' practice, at the hours we were not using the circle or equatorial, enabled him to become expert in their manipulation. Two of the gentlemen previously mentioned as appointed government students were named as assistants very shortly after our departure, and more than one proof has since been given that the administration cherishes a desire to promote the interests of astronomy. The expedition which the President sent to Peru to observe the total eclipse of November 30, 1853, and the purchase of one of Kessel's best clocks, furnished with the most improved self-winding telegraphic register, may be cited as two such evidences.

The experience obtained in the first series—summer as it was with us—had led me to expect very little from the last one on Venus. Then the planet was far south, the air was dry, and we had few clouds to contend with: now, every condition was reversed, and in the whole pre-arranged period it was possible to make differential measures only on nine evenings prior to the conjunction, and on eighteen mornings subsequent to it. There was not one occasion when the measures were wholly satisfactory. The nearest approaches to it were in the evening twilight of June 23, when the record shows: "Sharp, clean images throughout; if the star would have permitted a little more light, I should have put down all the measures as satisfactory." And on the morning of August 12th: "Good morning; images not very sharp at first, but quite satisfactory during the last observations by daylight."

I could find no star in the place of H. C. 15551, R. A. $7h.\ 50m.\ 58s.$ Declination $+ 23° 19' 13''$, and therefore made measures with the nearest one which was approximatively of the magnitude assigned by Lalande to No. 15551. Of 47 meridian observations, some of them were very good, or at least they were so regarded when made.

More than the usual amount of work was accomplished by the assistants during these three

months. The winter of 1850 had convinced me that with so small a corps it would be impossible to sweep all the space between our zenith and pole, and I had limited the upper zone at declination — 65° 50′. As soon as the map was filled, showing that all the space south of that parallel had been once swept, they employed the remaining nights in re-observing doubtful spaces when individual measurements or magnitudes were marked for such revision—each of them not unfrequently making a series on the same night. Winter as it was, on 57 nights, between May 29th and September 9th, above 5,000 stars were observed, clouds obscuring those remaining of the preconcerted term. Too much praise cannot be given these gentlemen for the capability, zeal, and assiduity manifested in the laborious duties undertaken. Trials of patience and hours of physical discomfort were inevitable concomitants of zone work with our circle, yet there was no abbreviation of tasks partially self-imposed, and I boldly assert that few have ever persevered more cheerfully under the continuous employment which unfavorable weather forced on some months of our stay in Chile.

The observations for longitude, though not very numerous, probably give a very near approximation to the truth. There was no leisure to compute anticipated occultations for ourselves, and the Nautical Almanac tables were not reliable. Moreover, neither the zone work nor the differentials with Mars and Venus could be interrupted for the observation of occultations or moon-culminations. When the latter were not interfered with, every star predicted in the almanac as liable to occultation was looked for at the proper time; but there was more than one occasion when no occultation occurred, although the ephemeris made it nearly central in that parallel, and thus the list embraces only forty-four occultations—one hundred and seventeen moon-culminations. On the 5th of January, 1852, there was witnessed the very rare occurrence of a double occultation of η Geminorum. There are several lofty mountains with deep intervening valleys on the southern hemisphere of the moon. These become very conspicuous when the moon is far north, and in our note-books it was essential to record whether the zenith distance of the summits or that of the circular line of the disc was observed. On this occasion, η Geminorum remained 2*m.* 36.4*s.* behind the first mountain, was 36.9*s.* traversing the valley between it and the proximate peak, and finally emerged 4*m.* 05.8*s.* after the first disappearance.

The first contact of the moon's limb with the sun at the solar eclipse June 17, 1852, was hidden from us by clouds; but as the differences of their diameters were measured at transit over the meridian, and the end of the phenomenon was observed, these will add to the reliable data bearing on the determination of our longitude.

The meridional distance between the observatory on Santa Lucia and that of Mr. Mouatt, in Valparaiso, was ascertained by exchanging telegraphic signals, for which purpose the operators kindly placed the line at my disposal a few nights before I finally embarked from Valparaiso. Every precaution was taken by Lieut. MacRae at Santiago, and myself at Valparaiso, to insure an accurate result, and the mean of 100 signals—50 each way—showed the difference of longitude to be 3*m.* 56.51*s.*, with a probable error of ± 0.021*s.*

For the reason respecting occultations and moon-culminations given in the preceding paragraph, meridian planetary observations, except of Mars and Venus, are also few in number. Neptune, the planet to whose orbit our late able countryman Prof. S. C. Walker had devoted so much labor with such distinguished success, was followed at opposition whenever the zones would permit; but this was the only one.

A complete set of portable magnetical instruments was made under the direction of Colonel Sabine, R. A., by Jones and Barrow, of London. This embraced a declinometer, a unifilar magnetometer, with a separate vibration apparatus and a dip-circle, with reading microscopes, all which instruments are described in a volume by Captain Riddle, R. A., published by authority of the Lords Commissioners of the Admiralty, and are noticed more at length in the appropriate volume (Vol. 6) of our work. Finding that the rock of Santa Lucia strongly influenced the magnets, as the iron bars of our windows were too near for absolute determinations

on our own premises, the proprietor of an extensive garden in the immediate vicinity very kindly permitted its use. On the 1st, 11th, and *term-days* of each month, observations were made there for the total horizontal force; the inclination was observed on the first two days, and the declination on that last named. When either the 1st or 11th fell on Sunday, the observations were made on the following day. On the *term-day* the changes of the declination also were noted at short intervals, extending through 24 hours. These last observations were under charge of Mr. Smith, who was occasionally aided by the Chilean students of astronomy. Those for absolute elements during the first year were made by Lieut. MacRae and myself; subsequently, the declinometer and dip circle were given up to Mr. Phelps.

The meteorological instruments comprise a barometer of Hassler's construction, having an internal diameter of six tenths of an inch; standard thermometers by Troughton & Simms and Jones; self-register thermometers by the former artists, and a psychrometer by Bunten. The Reaumur scale of the last is divided on paper, and enclosed in a glass cylinder surrounding the tube, to which its lower extremity is joined by fusion. By the capillary action of a linen cord, one of the bulbs was constantly supplied with water from a bird-glass. Some time after the observations commenced, a spirit-register thermometer, divided on the tube to single degrees, was converted into a minimum wet-bulb, to which moisture was conveyed in a similar manner as to the preceding. The barometer was suspended in a corner of the office-room; all the others within boxes open at bottom, and under the adjoining balcony on the south side of the house. Observations were commenced in November, 1849, and, during the first year, were continued throughout the day and night at intervals of three hours. Afterwards, the journal was placed wholly under the charge of Mr. Smith, and the 3 A. M. observations were necessarily omitted. Besides these tri-hourly records, there were hourly notations on the meteorological *term-day* of each month, omitting the hours from 1 to 5 A. M., both inclusive, when Mr. Smith was the only observer. The journal closes with September 13, 1852.

Among the interesting notes with which it abounds, are those relating to the frequent earthquakes experienced. A general summary of these, together with such deductions as it was possible to draw from observations, which the phenomena themselves almost incapacitate one from recording properly, have been given in Chapter IV, Vol. 1, and allusion is made to them here only because of their constant influences on the adjustments of our astronomical instruments. At other observatories, the astronomer either finds the level, zenith-point, and azimuth of his meridian instruments almost unchanged during weeks and months, or they are subject to deviations following some general law of which the records of his meteorological journal afford him satisfactory exponents, and his adjusting screws may remain untouched. We dared not rely on the permanence of ours from the commencement to the close of a single series of observations; for, besides the shocks that vibrated walls, whose warning or accompanying rumble started us into attention, there were an infinity of others to which man is physically insensible, but whose occurrences were quite plainly indicated by disturbances of the meridian circle and clock. Multiplying work of a certain character, as these imperatively did, there was less time for more interesting observations, and the verifications became greatly more laborious. How excessive these disturbances were, may be judged of from the fact that the earthquakes of one day retarded the clock $11\frac{1}{2}s.$, and changed the azimuth of the circle piers $5'$.

Our work in Chile was completed. Dr. Moesta had taken charge of the NATIONAL OBSERVATORY on the 14th September; our original observations had been packed to go round Cape Horn, and the copy remained to accompany me across Panama; very cordial acknowledgments had been tendered to the government for its unremitting courtesy, consideration, and assistance; a most complimentary letter of leave had been received in reply, and there remained but to order the assistants to the United States before embarking myself. The route of Lieut. MacRae had been a subject of thought for some time. There was an interesting question in magnetism to be solved, and many years might elapse before another equally favorable opportunity would occur; the geography and meteorology of the region he would traverse for these observations

were almost unknown, and of themselves merited a special journey; I therefore determined to place suitable instruments in his charge, and to direct him to proceed home via the Uspallata pass of the Andes, and the pampas of the Argentine republic. In addition to the magnetical instruments, he was supplied with three pocket-chronometers; a sextant and an artificial horizon; a Bunten's and an aneroid barometer; thermometers, &c.; and his orders were as follows:

"It being considered of much interest to science that a series of magnetical and other observations should be made at various heights and across this continent, you will take charge of the instruments selected for the purpose, and proceed to the United States, via the Uspallata pass and Buenos Ayres. The successful prosecution of your expedition being dependent on the transitable condition of the Andes, for which no definite period can be assigned, the time of departure from Santiago is left to your discretion. On arriving at Buenos Ayres or Montevideo, should you ascertain that the United States can be reached more expeditiously by so doing, you are authorized to proceed to England in the mail steamer, in which case you will convey the instruments to Woolwich and repeat the observations there also, for the purpose of ascertaining what changes, if any, have taken place in the magnets since they were first examined by Col. Sabine, R. A. And as there are facilities for determining the temperature co-efficients of the magnets at Woolwich which may not be so readily accessible at Washington, should you visit England, it is desirable that these experiments should not be omitted.

"In the journey across the Andes and pampas of Buenos Ayres, the objects to which your attention is especially directed are: 1st. The law of the decrease of magnetic intensity with height. 2d. The measurement of zenith distances of celestial objects exceeding 90°, with a view to improving tables of refraction. 3d. Geographical information. 4th. Meteorology.

"The height of the Uspallata pass being about 14,000 feet above the level of the sea, it is desirable that all the magnetical elements be determined at five nearly equi-distant elevations, both ascending to the Cumbre and descending towards Mendoza. At the summit, the observations for total intensity should be *repeated*, and at not less than two intervals of the deflecting magnet. Here, also, you may have the best opportunity for observing zenith distances. Crossing the pampas, the magnetical observations should be made, as nearly as practicable, at every hundred miles of longitude, or, assuming Mendoza to be in longitude 69° west of Greenwich, and Buenos Ayres in $58\frac{1}{2}$°, there will be six stations between these two cities.

"Though it is not to be expected that you will have time to execute an elaborate map of any great breadth of country, your chronometers and astronomical instruments will enable you to locate with far greater accuracy than is now known, not only the stations you may select, but also the towns, rivers, and lakes near which you may pass. Whatever information you collect cannot fail to be of the highest interest to geography, and your attention is particularly invited to the lakes and rivers lying between Mendoza and Rio Quinto, just beyond San Luis. Have these rivers and lakes outlets in the Parana, or are their waters lost in the sands of the pampas? It is possible that manuscript maps will be found at some of the cities you may visit, of which it may be permitted to make copies.

"Nine A. M., and 3 P. M., being near the hours of maximum and minimum atmospheric pressure, should be selected for meteorological observations whenever you are stationary. These, better than any others, will enable us, when calculating the elevations of your stations, to determine the corrections applicable to observations at other epochs. The temperature of dry and wet thermometers, the direction and estimated strength of winds, and character of clouds, will occupy your attention also. To these, many notes may be added respecting the hours at which the winds begin in the morning; the electrical state of the higher atmosphere; whether there are strata of clouds moving in different directions above the Andes—facts that will throw light on the meteorology of a region almost if not quite as little known to us as is its magnetical condition.

"Baron Humboldt has desired to be informed whether the snow on the mountains is of a 'glowing red' color about sunset and sunrise, as he had often observed it on the Alps and the

Himalaya chains at those periods. From this side of the Andes we have not unfrequently witnessed such color about sunset, and your journey will afford opportunities to ascertain whether the phenomenon is observable in the morning. Conversations with intelligent Argentines give reason to believe that there are periods when the atmosphere is in such a condition about sunrise as will reflect the red rays from lofty mountain tops to observers on the plain.

"Any information you can collect respecting the populations through which you pass; their resources, both agricultural and mineral; their manufactures and commerce with other towns of the republic; the number of births and deaths; the condition of morals, diseases, and crimes—all will give additional interest to your report.

"In a service of the nature on which you are about to set out, of necessity, much is left to your discretion. Your ability and zeal in behalf of the Expedition, and the service to which we belong, afford every confidence that the duty will be executed with credit to yourself and the navy. At its completion, proceed to Washington and report to me, furnishing, as shortly thereafter as may be practicable, a detailed narrative, which will be presented with my report to the honorable Secretary of the Navy.

"Six hundred dollars are furnished you for travelling expenses, and a draft on Messrs. Baring Brothers for £100, equal to $484, on account of your pay from 1st of October proximo, inclusive. Of the former you will keep an exact account, taking vouchers whenever it is possible to obtain them, to be returned in the settlement of your account at the office of the Fourth Auditor.

"Wishing you a pleasant journey, and early re-union with the other members of the Expedition, I am, &c."

Lieutenant MacRae returned to the United States in April, 1853. Having been thrown from his mule shortly after leaving Mendoza, his barometer was broken, and it was feared that the rates of his chronometers were so disturbed as might throw doubt on the longitudes of the magnetical stations selected on the great pampa. Most laudably and earnestly desirous to perfect his work, he immediately volunteered to return at his own cost; and being permitted to do so by the honorable Secretary of the Navy, he sailed for Buenos Ayres in August, crossed both the Portillo and Uspallata passes, and finally arrived at Washington in March, 1854. His report has been given at length in Vol. 2.

It will be remembered that the programme of the Expedition proposed a collection of objects in natural history. Unfortunately, our party was so small that no member of it could be spared from the more pressing duties of the mission. Nevertheless, through friends, and by purchase, quite a large proportion of the native birds and minerals, together with some of the mammals, fish, reptiles, shells, fossils, botany, and Indian antiquities, were brought home by me. Many of the mineralogical specimens are of rare interest and value. Plants, bulbs, and seeds were also forwarded to the government establishment at Washington every few months of our residence abroad, and many of them of a useful and ornamental character, wholly new in the United States, are now thriving. Such of the objects as were new to science have been well figured, and are described by eminent gentlemen selected by the Smithsonian Institution, which very considerately consented to direct their elaboration. The names of the naturalists prefixed to the several appendices of Vol. 2, are satisfactory evidences that none could have performed more ably the duties with which they had been intrusted.

Duty having constantly confined Mr. Smith to Santiago, or its immediate vicinity, he was unwilling to return to the United States without having seen something more of Chile. He therefore resigned his appointment, and proceeded to the southern provinces, where he had an opportunity to learn more of the Araucanians than has probably ever been permitted to an intelligent white man. We parted from him with regret. Mr. Phelps and myself embarked at Valparaiso October 1, and after a detention of fourteen days on the isthmus of Panama, reached New York just thirty-nine months after I had left that city.

WASHINGTON, 1854.

J. M. GILLISS.

OBSERVATIONS

OF

THE PLANETS MARS AND VENUS,

AND

CERTAIN PRE-SELECTED STARS NEAR THEIR APPARENT PATHS:

1849–'52.

MARS AND VENUS.

SANTIAGO OBSERVATIONS.

INTRODUCTION.

DESCRIPTION OF THE OBSERVATORY.

The rotary observatory of the astronomical expedition occupied a terrace constructed 175 feet above the streets of Santiago, and on the northern slope of Santa Lucia. Its elevation above the sea is 1,940 feet. The terrace was formed partially by breaking down crags of the rock composing the hill, and partially by building a dry wall thirty feet high, upon a projecting ledge, from the west side. Between the wall and slope of the hill, the space—perhaps six feet wide at top—was filled with fragments of porphyry and loose earth, to which solidity was given by pouring in water during the progress of the work. An artificial surface was gained by these operations forty feet in extent from east to west, and twenty-five feet wide from north to south. As this terrace is nearly ten feet more elevated than that on which the observatory building for the meridian circle is erected, a flight of steps was made from one to the other by using the columnar strata of the hill. The rotary observatory occupies the western side of its terrace, with only a narrow pathway between it and the face of the artificial wall.

The pier for the telescope was first built. On a mass of masonry, five feet in diameter and two and a half feet high, there are secured four capping-stones of red porphyry that form an octagon seven inches thick and inscribed in a circle 6.5 feet in diameter. No single stone of such dimensions could have been quarried by the artisans of Santiago, and if obtainable, could not have been raised to the observatory without sending to Valparaiso for machinery. The base of the masonry was the native rock, and the bed and joints of the cap-stone were filled in with a grouting of hydraulic lime. A foundation of masonry, fifteen feet in diameter, and rather more than a foot in height above the surface, was built on the rock, *in situ*, surrounding the pier, to receive the sill of the observatory.

The sill, formed from circular segments of one and a half inch plank, five and a half feet long, is put together so as to break joints, and rests immediately on wedges laid on the masonry diametrically. A grooved cast-iron rail is secured by screw-bolts and nuts near the centre of its upper surface, and the level of the sill is perfected by means of the wedges. The curb is formed in the same manner, but of rather stronger wood, and it is rendered more inflexible by the manner in which the corresponding grooved rail is secured to its under side. It rests on six 24-pounder cannon balls. Both the curb and sill are composed of two thicknesses of plank. The frame-work of the building, supported on the former, is of light and well-seasoned yellow pine, and the weather-boards are of white pine, tongued and grooved together, and fastened to the frame by screws. The height to the eaves is eight feet. The roof is a cone, having for its apex a tin cap, hung by one edge on long hinges, and which, when closed, laps two inches over the wood-work all round. The aperture covered by the cap is two feet in diameter; the width of the door in the inclined roof twenty inches. An upright, that passes through the roof and

is bolted to one of the rafters, serves as a leader for the pulley to elevate the cap. This may be thrown beyond the vertical, if necessary, and a single cord fastened to the strengthening bars of tin across its base, serves to pull it down after the inclined door has been first closed. Although of like materials and construction as the weather-boarding, a canvass cover was accurately fitted to the roof for additional security. This was drawn tightly over the planks, and when securely nailed down and painted, the portion obstructing the door-way was cut away. There is a small window opposite the door of entrance.

The foundation-wall was sufficiently wide to support the ends of the floor-joists, also. These timbers were framed entirely free of the masonry-pier in the centre, and were of such width that the floor was on a level with the upper surface of the curb. To prevent the building from wabbling, there are three horizontal, equi-distant, and adjustable rollers secured to the joists, the space between them and the curb not exceeding one-fourth of an inch.

The building was first erected at Washington, and its several portions carefully numbered before taken down for transportation. As it was extremely light, no machinery was required to turn it, slight pressure by the hand being quite sufficient to move it in either direction. Altogether, it may be ranked among the most economical and easily-managed rotary observatories ever built.

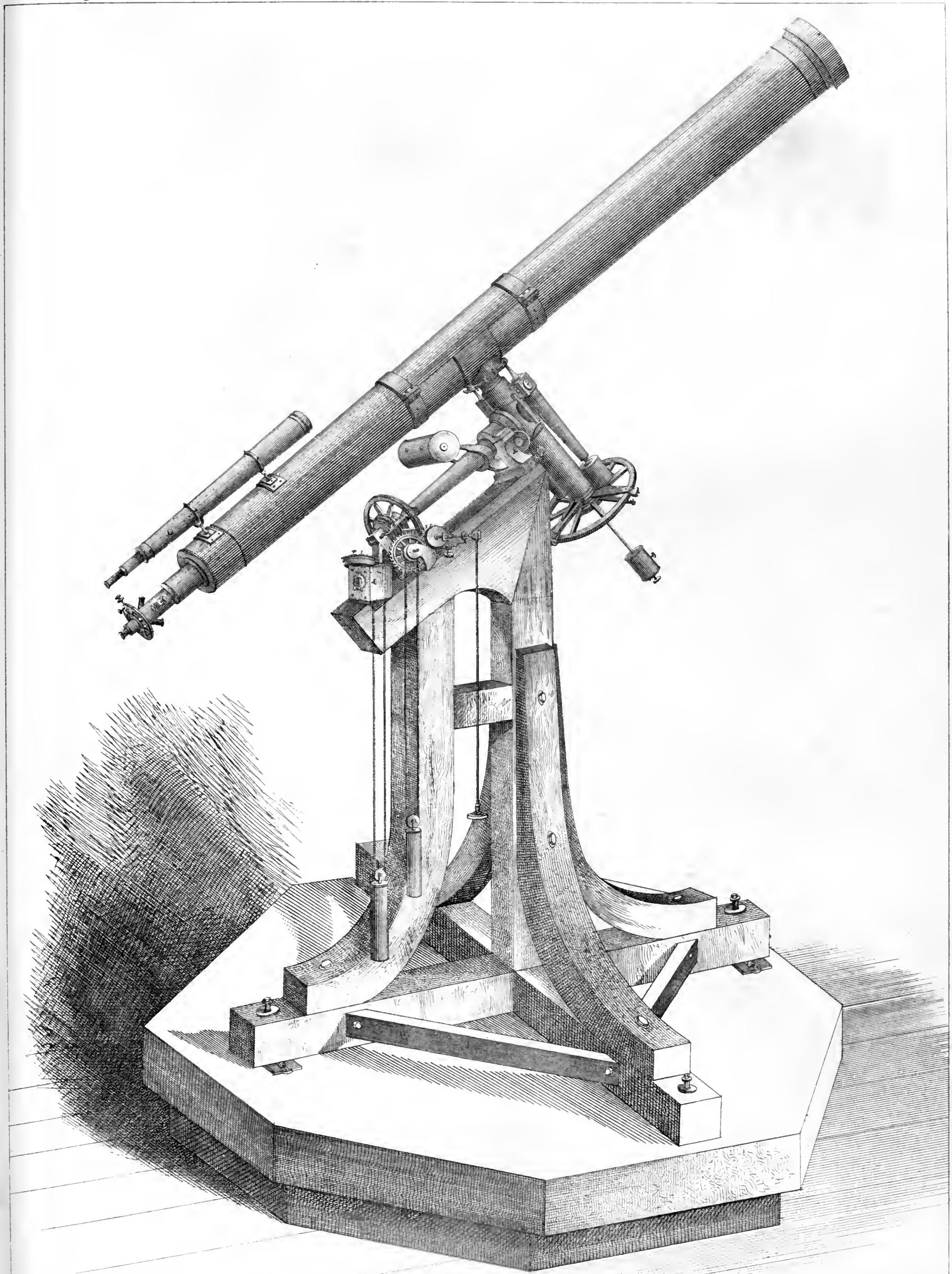
THE EQUATORIAL.

The equatorial telescope was made by Mr. William J. Young, of Philadelphia; its object-glass, from French materials, by Henry Fitz, jr., of New York; and its micrometer by Mr. William Würdeman, at Washington. As will be seen in the opposite plate, the construction of its stand is that devised by Frauenhofer, and since so successfully built by Messrs. Merz & Mahler for observatories in many parts of the world. The diameter of its object-glass is 6.4 French inches, with a focal length of 103.7 inches. Its polar and declination axes are frustums of steel cones, the former twenty-one and a half inches long, with diameters of two and a half and one and three quarters inches at its two extremities, and the latter twenty-two inches long by three and a half and two and a half inches diameter, respectively.

The hour-circle, with a diameter of nine and a half inches, is divided on a band of inlaid silver into spaces each of four minutes of time, which are read by two opposite verniers to four seconds, and by estimation may be easily subdivided to one second. The declination-circle has a diameter of twelve and a half inches, divided, also on a silver band, into spaces of ten minutes of arc, divisible by two verniers into ten seconds. It is numbered from 0° to 360°, and reads 0° when the telescope, pointed to the equator, is on the west side of the stand. The finder has an object-glass, 1.75 inch in diameter, with a focal length of eighteen inches. This latter object-glass and the eye-pieces to the micrometer are somewhat imperfect, and there is some little play to the declination axis; but, except these defects, the instrument is admirably constructed.

The supporting-stand is of solid and well-seasoned black walnut, dried in a kiln for more effectual security against shrinkage in the dry summer atmosphere of Chile. It rests on four heavy steel screws, by means of which the adjustments for polar elevation and transverse level may be effected. The azimuth is controlled by horizontal screws, working through iron clamps let into and firmly fastened to the pier at the two meridional foot-screws. A driving-clock is fitted to the instrument; but dust accumulated so rapidly in summer, that its use was never attempted after the first few nights.

The repeating-micrometer has a divided circle of four inches diameter, which may be read by one vernier to 30″. Constructed on the English plan, its counting-scale is within the box, each five teeth of the comb being separated by a deep indentation. It has five permanent transit-wires, and two parallel movable wires perpendicular thereto. One of the latter is provided with a register-head, divided into one hundred equal parts; the other is only a zero-wire. Its eye-lenses, with magnifying powers from one hundred and fifty to five hundred times, may be moved parallel with the register-wire by means of a rack and pinion and dove-tailed slide.



P.S.Duval & Co's steam lith. press, Philada.

THE EQUATOREAL.

For "dark-field" illumination there are two lamps suspended on gimbals, that throw light through the small tubes seen on the plate in advance of the micrometer; but there is no means for illuminating the field. When unpacked, all the wires put in by the maker were found to have been broken, and the most available material from which to insert a new system was an exceedingly delicate and uniform fibre of unspun Chinese silk.

From the 6th of December, when the instrument was fully mounted, to the evening of the 10th, was passed in becoming familiar with its peculiarities, and bringing it into approximate adjustment, correcting its errors one by one to nearly minimum amounts. It is unnecessary to transcribe the observations made during the several approximations, but only those which were just prior to commencing the appointed series of differentials. After the observations of December 10th, none of the screws were ever disturbed.

Observations to determine the position of the Instrument.

Date.	Dec. circle.	Star.	Time.	Hour circle.	Dec. circle.	Barom.	Temp.
1849.			*h. m. s.*	*h. m. s.*	° ′ ″	*Inches.*	°
Dec. 10	E.	α Eridani . .	1 30 2.3	11 57 54	57 58 35		
	W.	. . . .	1 42 17.0	12 10 10	302 1 0		
	E.	α Pavonis . .	2 13 41.4	6 0 0	302 46 50		
	W.	α Ceti . . .	2 25 18.9	11 30 52	3 29 50		
	E.	. . . .	2 35 23.0	11 40 56	356 30 30		
	E.	. . . .	2 39 43.6	11 45 17	356 30 30		
	W.	. . . .	2 45 46.7	11 51 20	3 30 0		
	W.	ι Argus . . .	3 11 54.0	6 1 12	58 40 0	28.170	67.5
1850.							
Oct. 18	E.	β Aquarii . .	21 8 7.1	23 42 49	6 15 30		
	W.	. . . .	21 20 39.7	23 55 26	353 45 0		
	E.	β Tri. Aust. . .	21 59 48.2	6 16 18	297 2 25		
	W.	γ Hydri . . .	22 14 7.3	6 24 23	74 42 0	28.000	64.0
1851.							
Dec. 16	W.	η Argus . . .	4 38 6.4	6 0 0	58 54 30		
	E.	β Orionis . .	5 4 29.8	11 56 0	8 23 30		
	W.	. . . .	5 12 25.0	0 3 55	351 37 10	28.040	61.5
1852.							
May 29	E.	α′ Crucis . .	12 11 7.6	11 52 0	62 17 20		
	E.	α Argus . . .	12 21 20.5	6 0 0	307 22 0		
	W.	α′ Crucis . .	12 26 30.4	0 7 24	297 43 20	28.150	46.8

Let d and d' represent the readings of the declination-circle, d when that circle is to the *east* of the stand; t and t' the times of observation, t when the declination-circle is east; h and h' the corresponding hour-circle readings; π the polar distance of the star observed, ϱ its refraction in altitude, and ϱ' its refraction in polar distance: then, if we call the index-error of the declination-circle e, the collimation-error of the telescope c, the vertical error of the polar axis x, and its azimuthal error y;

$$e = \tfrac{1}{2}(d + d' - 360^\circ);$$

$$c = \tfrac{1}{2}\left\{(t - t') - (h - h')\right\};$$

when the star is in the meridian,

$$x = d + e + \varrho - \pi;$$

and when the star is six hours from the meridian,

$$y = d + e + \varrho' - \pi.$$

Applying these formulas to the preceding observations, the instrumental deviations at the successive dates were as follows:

Instrumental deviations.

Date.	e.	c.	x.	y.
1849.	"	"	"	"
Dec. 10	12.5 W.	±0.0	+44.5	−63.7
1850.				
Oct. 18	15.0 E.	+32.85	−82.9	− 1.6
1851.				
Dec. 16	20.0 E.	− 1.50	− 4.2	+73.0
1852.				
May 29	20.0 E.	+ 4.20	−32.2	−49.0

These results show that the deviations of the equatorial could have no appreciable influence on observations made as were the differential measures with the planets Mars and Venus.

Value of the Micrometer Screw.

To determine the value of the micrometer-screw, transits of β Hydri were observed over the index and micrometer wires, placed at intervals of five, ten, and twenty revolutions apart. They gave the following results at different periods:

Date.	Star.	No. of revolutions.	No. of observations.	Mean of the times.	Equatorial interval.	Value of one revolution.
1849.				s.	"	"
Dec. 13	β Hydri . . .	10	10	62.800	194.130	19.413
	do . . .	20	10	125.650	388.415	19.421
1850.						
Feb. 1	do . . .	10	10	63.050	194.934	19.493
	do . . .	10	10	63.110	195.120	19.512
	do . . .	5	10	31.685	97.962	19.592
1851.						
Mar. 14	do . . .	10	10	62.820	194.366	19.437
20	do . . .	10	20	63.040	195.057	19.506
1852.						
Mar. 16	do . . .	10	20	62.765	194.550	19.455
19	do . . .	10	20	62.860	194.587	19.459
	do . . .	5	20	31.435	97.309	19.466
June 2	do . . .	10	20	63.175	195.944	19.594

The value adopted for the reduction of observations is

$$19''.49.$$

The diameter of the micrometer-wires was first ascertained by turning the telescope towards clear sky during day-light, and bringing the movable wire in contact with the index-wire alternately on each of its sides. Under a magnifying power of 235, the index-wire appears s ome what the greater of the two, but they formed part of the same fibre, and the difference between them could not be detected when superposed. A mean of ten measures by day-light gave for the diameter of the two $2''.504$, or, on the assumption of equality, each wire had a diameter of $1''.252$. Observations by lamp-light, however, give a very different result. Thirty measures, made at different periods, show that the effect of the lamps is to increase the apparent diameters from $1''.252$ to $2''.199$. In the reduction of all observations after lamp-light, the diameter adopted is

$$2''.20.$$

Frequent occasions occurred, during the progress of the adjustments, to test the optical capacity of the instrument. The first object viewed with it was the planet Saturn; and though twilight had scarcely closed in, five of the satellites, the shadows of the rings, and dark interior spaces, were admirably shown under a magnifying power of 235 times. The sixth star of

the trapezium in the sword-handle of Orion was distinctly seen whenever sought at reasonable altitudes; it separated unequal and close double stars, as λ Octantis, with great precision and sharpness, and defined the millions in the gorgeous cluster surrounding 47 Tucanæ with wonderful effect. An aggregation of star-dust, as appears this most extraordinary object, a power of 235 almost separates each brilliant particle from the rest.

LATITUDE.

Twelve hundred and sixty observations have been discussed for the latitude of the meridian circle, from which only nine observations of the twenty-two selected stars have been excluded, and on each of these occasions there is doubt of the true circle-reading.

Bessel's refractions, as constructed by Professor Coffin, U. S. N., for the Washington Observatory, have been used in the computations. A special table for barometric corrections, rendered necessary by the elevation of the observatory above the sea level, has been so formed that all the logarithms remain positive on subtracting .02306 from Log. R of Table II.

All the observations were reduced to mean places of the stars January 1st, 1851, and the declinations at that date have been derived from the British Nautical Almanac for 1858, by application of the annual variation in declination during 7 years.

From quick moving stars.

No.	Star.	Zen. dist.	Adopted mean declination.	No. of observat'ns.	Resulting latitude.	Probable error.
		° ′	° ′ ″		° ′ ″	″
1	α Columbæ	S. 0 43	−34 9 22.28	56	33 26 24.88	±0.243
2	α Piscis Aust.	N. 3 2	30 24 38.54	41	25.87	.257
3	ε Canis Maj.	N. 4 40	28 46 22.38	62	25.29	.234
4	α Scorpii	N. 7 21	26 5 47.43	92	25.56	.160
5	15 Argus	N. 9 34	23 52 40.46	67	25.03	.159
6	β Corvi	N. 10 52	22 34 20.09	37	26.26	.246
7	β Ceti	N. 14 38	18 48 19.54	29	25.40	.252
8	α Virginis	N. 23 3	10 22 55.48	39	24.46	.232
9	θ^1 Ceti	N. 24 28	8 57 13.84	34	25.33	.264
10	α Eridani	S. 24 34	57 59 41.72	46	24.66	.227
11	β Orionis	N. 25 3	8 22 40.70	14	24.49	.523
12	ι Argus	S. 25 12	58 39 3.69	79	23.45	.178
13	α Hydræ	N. 25 25	− 8 0 55.51	71	25.02	.193
14	α Ceti	N. 36 56	+ 3 30 6.84	45	25.87	.237
15	β Leonis	N. 48 51	15 24 17.17	38	25.00	.246
16	δ Leonis	N. 54 47	21 20 20.88	48	24.93	.199
17	β Geminor.	N. 61 49	28 22 52.83	51	25.92	.216
18	β Tauri	N. 61 55	+28 28 33.90	31	24.14	.406

No recent observations appear to have been accessible from which to correct the mean places of α Eridani and ι Argus subsequent to the publication of the Nautical Almanac for 1851, (in 1847,) and as one certainly is, and the other may, very probably, be in error, they have not been incorporated in the mean. Giving to each of the other stars weight proportionate to the number of observations, the latitude resulting would be S. 33° 26′ 25″.27 with a probable error of ±0″.042.

From circumpolar stars.

No.	Star.		Zen. dist.	No. of observat'ns.	Resulting latitude.	Probable error.
			° ′		° ′ ″	″
1	σ Octantis	U. C.	55 50	47	33 26 25.95	±0.212
		L. C.	57 17	32		
2	β Hydri	U. C.	44 40	39	26.18	.206
		L. C.	68 27	42		
3	β Chamæ	U. C.	45 02	56	25.88	.196
		L. C.	68 05	19		
4	α Tri. Aust.	U. C.	35 18	112	25.55	.125
		L. C.	77 49	24		

As these are wholly independent of tabular places, preference is given to the latitude resulting from them, though differing in excess from the determination by quick moving stars more than half a second of arc. Combining the four partial determinations of circumpolar stars by weights derived from the sum of the numbers of observations at each culmination by their product, the adopted latitude is

$$-33^\circ\ 26'\ 25''.89,$$

and comparing each of the observations with this, the probable error, by the method of least squares is $\pm 0''.0866$.

The equatorial is 53½ feet to the south of the meridian circle.

LONGITUDE.

The longitude of the circle computed by Mr. S. L. Phelps, from moon culminations and occultations observed during the same period is as follows,* the corrections to the moon's tabular place, referred to in both series, having been computed by the methods given by Professor Benj. Pierce in the Annual Report on the progress of the United States Coast Survey for 1854, pp. 115*–*120.

The equatorial is 16 feet to the west of the meridian circle.

Longitude from corresponding moon culminations.

Observed at	Moon's first limb. No. of observat'ns.	Moon's first limb. Resulting longitude.	Moon's first limb. Probable error.	Moon's second limb. No. of observat'ns.	Moon's second limb. Resulting longitude.	Moon's second limb. Probable error.	Adopted longitude of station.
		h. m. s.	s.		h. m. s.	s.	h. m. s.
Hamburgh	18	4 42 35.44	±1.71	..	. . . .	. .	— 39 54.10
Cambridge, (Eng.)	22	32.51	1.25	10	4 42 32.73	±2.64	— 22.75
Greenwich	29	32.45	1.05	8	32.25	3.42	.00
Greenwich, (moon's cor. tab. places) . . .	22	32.81	0.93	20	32.85	3.12	.00
Oxford	17	33.85	1.58	5	34.89	4.72	+ 5 2.60
Cambridge, (Mass.)	17	33.18	1.77	..	. . . .	. .	4 44 30.66
Philadelphia	23	33.90	1.51	5	35.06	5.59	5 0 38.56
Washington	9	35.73	2.22	1	39.21	. .	5 8 12.20
Charleston, (S. C.)	5	37.94	6.96	..	. . . .	. .	+5 19 45.00
Long. by weight	162	4 42 33.91	. .	49	4 42 33.27		
Longitude from moon culminations					4h. 42m. 33s.74 ±0s.993.		

* A public acknowledgment is due to the Astronomer Royal, G. B. Airy, esq.; Professor Challis, Cambridge, (England;) M. J. Johnson, esq., Radcliffe astronomer, and Professors Bache and Bond for their prompt courtesy in communicating observations of moon culminations in advance of publication, and to Lieutenant M. F. Maury, Superintendent United States Naval Observatory, for the apparent places of the group of stars preceding χ^3 Orionis, which Mr. James Ferguson determined by micrometrical differentiations with the latter star.

Longitude from occultations.

Date.		Star.	Phase.	Sid. time of observation.	Star's R. A.	Star's declination.	Computed correction to moon's place.	Resulting longitude.
1850				h. m. s.	h. m. s.	° ′ ″	s.	h. m. s.
Mar.	20	* Orionis	Im.	7 20 23.79	5 51 8.74	+20 3 23.8	—0.29	4 42 40.32
		* Orionis	Im.	21 1.79	15.23	19 58 27.2	0.29	22.58
		* Orionis	Im.	27 53.28	23.44	20 2 17.3	0.29	44.34
		* Orionis	Im.	53 59.87	52 1.54	19 48 0.5	0.29	32.21
		* Orionis	Im.	8 4 20.75	27.61	19 52 27.9	0.29	37.66
		* Orionis	Im.	47 35.60	53 46.85	19 55 38.3	0.29	45.32
		χ^1 Orionis	Im.	9 40 47.79	55 0.74	20 8 4.3	0.29	33.58
		χ^2 Orionis	Em.	10 7 56.93	5 54 34.71	19 41 8.8	0.29	20.86
May	14	Bessel . . . 346	Im.	10 24 20.91	6 17 53.98	20 30 57.5	0.87	38.46
		B. A. C. . . . 2084	Im.	10 55 28.11	6 19 0.68	+20 34 42.5	0.87	23.15
Nov.	8	B. A. C. . . . 6550	Im.	0 2 29.77	19 0 58.27	—20 2 7.5	1.25	31.32
	19	δ^1 Tauri	Im.	4 58 9.26	4 14 20.77	+17 11 13.6	1.22	36.55
		δ^2 Tauri	Im.	6 17 45.48	4 16 52.51	17 34 54.3	1.22	39.52
1851.								
Jan.	13	δ^1 Tauri	Im.	5 3 43.25	4 14 21.02	17 11 12.9	0.70	32.86
		δ^2 Tauri	Im.	6 45 24.91	4 16 52.72	+17 34 53.4	0.70	34.38
May	17	B. A. C. . . . 6179	Im.	12 35 57.46	18 6 21.11	—20 45 54.8	0.39	34.28
July	9	B. A. C. . . . 5573	Im.	15 39 18.28	16 32 41.96	—17 45 47.0	0.33	28.96
Nov.	14	B. A. C. . . . 3017	Em.	5 32 35.42	8 45 25.62	+20 31 25.5	0.82	28.49
Dec.	4	B. A. C. . . . 672	Im.	2 31 38.06	2 3 32.40	7 52 24.9	0.60	38.26
1852.								
Feb.	27	ε Tauri	Im.	6 45 42.72	4 19 58.19	+18 50 47.2	0.23	25.08
April	6	η Libræ	Im.	13 48 36.49	15 35 46.23	—15 11 51.4	0.34	40.67
May	5	ξ Ophiuchi	Im.	17 49 22.42	17 12 9.44	20 56 54.8	0.69	32.64
June	2	58 Ophiuchi	Im.	13 21 0.23	17 34 35.40	21 36 19.3	0.70	38.32
	3	ν^1 Sagittarii	Im.	18 34 36.78	18 45 15.43	—22 55 14.4	—0.62	4 42 40.05

Longitude from occultations . . . . . 4h. 42m. 34s. 16 Probable error . . . . ±0s.922

Making each result from occultation equivalent to two from moon culminations, and then combining the partial determinations by the two methods with weights proportioned to their respective numbers, we have for the adopted longitude of Santiago west of Greenwich

$$4^h\ 42^m\ 33^s.81.$$

DIFFERENTIAL OBSERVATIONS.

MODE OF OBSERVING.

A siderial chronometer was used in the differential observations. It was compared with the clock immediately before or after the series, though more frequently after the series for the evening was completed.

When the lamps were lighted, and the amount of illumination properly diminished, the telescope was directed approximately to the place of the planet, its declination circle clamped, and the relative place of the proper comparing star ascertained by inspection of the map and ephemeris. The instrument was then moved by the slow motion screws so that each object should pass equidistant from the centre of the field. Moving the micrometer screw so that its wire would nearly coincide with the object first in right ascension, the telescope was then turned to the west by the tangent screw to the hour circle until the first object to be observed was just without the field. It remained immoveable in this position until the transits and difference of declination of the two had been recorded, after which, it was again thrown to the west, and so

continuedly until the work for the night terminated. Except in cases where the two objects were so near in right ascension, or the space through which it was necessary to turn the screw was so great that one reading was, of necessity, after the second object had passed that wire, the difference of declination was measured by two independent readings of the micrometer when bisecting the star or tangent to the limb of the planet at transit over the middle wire. The observation was always perfected by turning the micrometer in the order of the number on its divided head and which was against the spring within the box. On one or, perhaps, two occasions this space was so great and the difference of right ascension so little, that it was indispensable to use both the slow motion screw of the declination circle and the micrometer. As would be inferred, these observations are not at all satisfactory.

To eliminate errors of irradiation and assumed semi-diameters, on all possible occasions the consecutive observations were of opposite limbs of the planet.

EXPLANATION OF THE PRINTED OBSERVATIONS.

Observations with the equatorial.

The printed observations, pages 2—305, require very little explanation.

The first column of each page contains the numbers for reference, with occasional italic letters, *a*, *b*, *c*, &c., indicating a note in the remarks accompanying each night's observations.

The second column contains the name of the planet, and the catalogue from which the comparing star has been selected. N.P; N.F; S.P; S.F, designate the limbs of the former; Rumker, 1673, refers to his "Mittlere Oerter von 12.000 Fix-Sternen;" Bessel, 405, refers to the 405th zone of Bessel; H.C. to the "Histoire Celeste" of Lalande; and W. C., to unpublished observations of the Washington Catalogue.

The five following columns contain the seconds of observation over the five wires of the equatorial, and the eighth column, the mean of these times. Broken observations have been reduced by means of the following equatorial intervals multiplied by the Secant of the declination of the object. The intervals were deduced from 100 transits of comparison stars.

Equatorial intervals.

	From December 10, 1849, to January 31, 1850.	From October 19, 1850, to Feb'ry 10, 1851.	From December 16, 1851, to January 1, 1852.	From January 1 to September 13, 1852.
	s.	s.	s.	s.
A.	+23.690	+23.687	+23.705	+23.552
B.	+11.801	+11.829	+11.797	+11.778
C.	— 0.025	— 0.002	— 0.098	— 0.022
D.	—12.013	—11.818	—11.756	—11.756
E.	—23.429	—23.743	—23.553	—23.553

Column 9 contains the distance of the limb of the planet or star from the stationary horizontal wire expressed in revolutions of the micrometer head. In both series of observations on Mars, and in the first Venus series + signifies that the moveable wire is to the north of the stationary wire, and *vice versa*. Prior to the second Venus series the micrometer was turned 180°, so that throughout these observations the symbols have the opposite signification.

Column 10 contains the difference of right ascension between the planet's observed limb and the star, at transit of the former over the imaginary central wire of the system.

Column 11 contains their difference of declination expressed in revolutions of the micrometer, + signifying that the planet is to the north of the star, and *vice versa*.

Columns 12, 13, and 14 contain the barometer and thermometer readings usually noted at the commencement and close of the observations.

Remarks respecting the condition of the atmosphere or other influence likely to affect the

work follow each night's observations, and then the results derivable prior to a final discussion of the series. These latter embrace the means of all the observations of each limb of the planet combined in groups according to the periods of time through which they extend; the chronometer corrections and true siderial times of observation at Santiago, and, finally, the diameters deduced from the transits and micrometrical measures. In the latter, the variation of the planet's $\left\{\begin{matrix}\text{Declination,}\\ \text{Right ascension,}\end{matrix}\right\}$ during the interval between the means of the times of observation of the two limbs has been computed from the "variation of $\left\{\begin{matrix}\text{Right ascension,}\\ \text{Declination,}\end{matrix}\right\}$ in one hour of longitude" given in the Nautical Almanac.

Finally, to facilitate comparison with corresponding observations at other stations, the differential refraction ($\Delta\rho$) for each of the means of the times has been computed from the formulæ in Vol. I, Bessel's Untersuchungen.

$$\Delta\rho = \frac{600''\alpha''}{\mathrm{Sin}^2\ (\mathrm{N} + \delta_0)}$$

$$\begin{array}{ll} \mathrm{Tan\ N} = \mathrm{Cos}\ \tau_0 \cot \varphi & \varphi = \text{Latitude,} \\ \mathrm{Sin\ M} = \mathrm{Sin}\ \tau_0 \cos \varphi & \tau_0 = \text{Hour angle,} \\ \mathrm{Cos\ Z} = \mathrm{Cos\ M} \sin (\mathrm{N}+\delta_0) & \delta_0 = \text{Declination,} \\ & \mathrm{Z} = \text{Zenith distance;} \end{array}$$

and to this end, special tables applicable to each series were calculated, in which the intervals of the arguments τ_0 and δ_0 were respectively 10^m and $10'$.

All the observations were made by myself, except those duly credited to Lieutenant MacRae, between the 12th and 17th of December, 1849. The most usual magnifying power was 150.

The transcripts and reduction of the Mars series, 1849–'50, and from February 28 to the close of the series, in 1852, have been made by Lieutenant T. H. Patterson, U. S. N., from the commencement to February 27, 1852, of the same planet, by Lieutenant Francis Winslow, U. S. N. All the observations of Venus have been prepared for publication by Assistant Daniel G. Major. The computations of Messrs Patterson and Winslow have been revised by Lieutenant R. N. Stembel, U. S. N., and Assistant Major, and, to insure greater accuracy in this publication, the proof sheets have been compared with the *original* observations.

THE MERIDIAN CIRCLE AND ITS ADJUSTMENTS.

The observations at length, and a detailed description of the instrument with which they were made, are given in Vol. IV. In pages 309–332 of the present volume there will be found only the means of the times of transit over the wires, and the means of the microscope readings, together with the corrections which have been applied for reduction of the observations to apparent right ascensions and declinations.

The instrument consists of two minutely divided circles reading to half seconds of arc by four micrometer microscopes supported by horizontal bearers enclosed in wood, and a telescope of 51 lines aperture, 73 inches focal length, and transverse axis 39 inches between the bearing surfaces of its steel pivots.

The eye end of the telescope contains one horizontal and seven vertical stationary wires, and two micrometer systems. One screw moves a single vertical wire, the other, *seven* horizontal wires. A revolution of the latter screw equals $27''.93$. The intervals of the systems (vertical and horizontal) rather exceeds four minutes of arc, and the eye-piece may be moved in its dove-tailed slides by racks and pinions until perpendicular to any desired wire. In addition to the usual suite of magnifying lenses, a collimating eye-piece accompanied the telescope.

For horizontal adjustment of the axis, there is a hanging level, whose glass tube, enclosed within a cylinder of brass covered with cloth, is read through a glazed aperture in the upper portion of the cylinder. One division of the tube equals $1''.1$; the level hung within the bearing points of the pivots.

The whole instrument was constructed in the most substantial yet highly finished manner by Messrs. Pistor & Martins, at Berlin, and is mounted on massive piers of red porphyry, based on the native rock.

Usually, all the adjustments were carefully examined both before and after each series of observations. That for *horizontality of the axis*, by not less than six readings in reversed positions of the level; the *nadir point*, by reflection of the stationary horizontal wire from a basin of mercury; the *line of collimation*, from the ascertained level error and distance between the central vertical wire and its image, as seen from the surface of mercury, and measured with a micrometer screw; and the *azimuth*, from the transits of fundamental stars of the Nautical Almanac. The same pairs of stars in each series were observed quite uniformly through the pre-appointed period.

Explanation of the printed observations.

Column 1 contains the number and letter for reference to the foot notes.

Column 2 contains the year and day.

Column 3 contains the name of the object observed. The names of the catalogues from which the stars in this column have been selected are already given.

Column 4 contains the means of the transits over the several vertical wires The reduction of broken observations to mean of wires has been performed by means of the equatorial intervals adopted for the specific period given in the introduction to Volume IV.

Column 5 contains the instrumental corrections. These are the algebraic sums of the several corrections for collimation, level, and azimuth, which will be found under the corresponding date in Volume IV.

Column 6 contains the clock error, derived from fundamental stars of the Nautical Almanac, brought forward to the date of observation by rates deduced from errors on the previous and subsequent nights.

Column 7 contains the apparent right ascension of the *limb* of the planet and star as observed at transit over the meridian of Santiago. The azimuth error has been deduced from the apparent places of the observed stars given in the Nautical Almanac. But as the limited comparison which it has been possible to institute conclusively satisfies me that many, if not all, of the southern circumpolar star places must be corrected before the true instrumental errors will be positively known, the right ascensions now given will, therefore, most probably differ from those of the same objects that will be found in Volume IV.

Column 8 contains the mean of the four readings of the circle microscopes. When the object was observed with a micrometer wire, the fact is stated in a foot note, and its distance from the stationary wire or parallel of reference is given in revolutions of the micrometer head. In all such cases the equivalent arc interval has been applied with the proper sign.

Column 9 contains the refraction. This has been computed from the constants given in tables published as an appendix to the volume of Washington observations before mentioned.

Column 10 contains the nadir correction adopted for the special series from determinations immediately preceding or following the observations.

Column 11 contains the semi-diameter of the planet as given in the Nautical Almanac.

Column 12 contains the observed apparent declination of the centre of the object at transit over the meridian of Santiago. In the Mars series, when the difference of right ascension between the planet and comparing star was too small to permit the circle micrometers to be read in the interval of their transits, then the circle was clamped before the preceding object came into the field, and the slow motion screw was turned until the stationary horizontal wire accurately bisected the star, or was tangent to the planet's limb at the middle vertical wire, if the latter preceded. When the second of the two objects entered, the micrometer screw carrying the horizontal system was turned until the nearest wire bisected or was tangent to its limb in

the centre of the field, and the corresponding reading was appropriately entered. The circle was read after the transits of both objects had been recorded. In these cases, therefore, the declinations are relative, and any accidental error in the circle reading is common to both objects. There were no such differential measures of declination with the meridian circle between the planet Venus and neighboring stars, nor was the circle permanently mounted until after the termination of the first Mars series. When it was ready for use, the pre-selected stars of that series were too near the sun for observation, and afterwards the zone work monopolized it at the hours when they passed the meridian. Subsequently, Lieutenant Maury, Superintendent of the Washington Observatory, has, at my request, caused them to be observed, together with the stars with which Venus was compared near the two inferior conjunctions, and their mean places are given in the subjoined tables. After the termination of the second series of differentials with Mars, several additional meridian observations of each comparing star were made for the purpose of rendering them available in cases where no corresponding measures with the equatorial were obtainable.

Stars with which Mars was compared in 1849–'50.

Star.	No. of observations.	Mean right ascension, 1860–0.	No. of observations.	Mean declination, 1860–0.
		h. m. s.		° ′ ″
Bessel 396	3	5 3 41.760	12	+26 17 8.85
Bessel 405	3	5 11 6.488	10	6 31.87
Bessel 523	2	5 18 25.176	10	27 30.31
Bessel 405	2	5 22 20.421	10	28 20.19
Bessel 405*	.	5 26 13	.	32
Bessel 405	3	5 30 13.971	11	31 57.10
Bessel 405	1	5 46 56.049	10	27 0.64
Rumker 1673	1	5 54 44.989	10	16 36.01
Rumker 1680	1	5 55 8.80	11	+26 21 6.10

Stars with which Venus was compared, 1850–'51.

Star.	No. of observat'ns.	Approximate right ascension, 1856.	No. of observat'ns.	Mean declination, 1860–0.
		h. m. s.		° ′ ″
H. C. 30556	..	16 41 19	2	—26 29 36.69
W. C.	..	16 43 21	2	26 40 38.89
W. C.	..	16 52 24	3	27 2 18.19
W. C.	..	16 55 6	3	27 0 39.47
W. C.	..	17 0 9	2	27 12 40.41
W. C.	..	17 7 32	2	27 23 56.22
W. C.	..	17 11 7	1	27 37 22.27
B. A. C. 5839	..	17 11 34	1	17 36 21.18
W. C.	..	17 13 16	3	27 51 35.17
H. C. 31784	..	17 21 20	2	17 41 21.75
H. C. 31791	..	17 21 37	3	17 41 44.46
H. C. 31931	..	17 25 38	2	17 44 0.18
Lacaille 7371	..	17 29 10	3	27 57 25.89
Taylor 8219	..	17 39 5	3	18 3 0.32
W. C.	..	17 44 18	3	28 1 10.11
B. A. C. 6063	..	17 47 40	2	28 2 17.88
W. C.	..	17 52 50	1	27 52 5.62
W. C.	..	17 53 53	2	27 49 17.15
W. C.	..	17 56 20	1	27 50 14.01
W. C.	..	17 59 26	2	27 39 27.43
W. C.	..	18 7 4	1	25 45 10.44
W. C.	..	18 7 24	2	27 27 13.71
B. A. C. 6214	..	18 12 19	2	26 8 33.24
B. A. C. 6261	..	18 18 47	4	26 42 46.12
Taylor 8533	..	18 24 1	2	—19 4 6.26

* Not found, though repeatedly sought.

Stars with which Mars was compared in 1851–'52.

Star.		No. of observat'ns.	Approximate right ascension, 1856.	No. of observat'ns.	Mean declination, 1860–0.
			h. m. s.		° ′ ″
H. C.	16237	..	8 10 35	2	+24 36 28.64
W. C.		..	8 13 25	2	24 27 55.72
Bessel	344	..	8 16 23	2	24 23 35.60
H. C.	16464	.	8 16 51	1	24 0 2.08
Bessel	344	..	8 28 29	1	23 44 0.00
W. C.		..	8 30 28	1	23 22 44.75
Bessel	344	..	8 35 22	2	23 12 51.51
W. C.		..	8 34 57	2	23 1 37.42
Bessel	344	..	8 40 33	2	22 45 34.27
Bessel	278	..	8 44 15	2	22 54 45.86
Bessel	278	..	8 46 13	2	22 20 59.44
Bessel	278	..	8 47 41	1	22 13 29.11
Bessel	278	..	8 50 40	1	21 42 25.27
Bessel	278	..	8 52 28	1	22 0 39.67
Bessel	278	..	8 54 2	2	21 32 18.63
Bessel	275	..	8 58 31	2	21 4 30.94
Bessel	275	..	8 58 53	2	21 9 27.90
Bessel	278	..	8 59 42	2	21 27 30.30
Bessel	275	..	9 4 42	1	20 35 43.67
Bessel	275	..	9 4 43	1	20 37 15.35
W. C.		..	9 8 26	1	20 13 37.41
W. C.		..	9 10 36	2	20 0 27.29
B. A. C.	3181	..	9 12 32	1	+19 40 52.63

The right ascensions were observed by Professor Alexander Lawrence, U. S. N., with the west transit instrument, and the declinations by Professor M. Yarnall, U. S. N., with the mural circle.

Column 13 contains the initials of the observers names: G—Gilliss; M—MacRae; P—Phelps.

The transcripts and reductions were made by Lieut. R. N. Stembel, U. S. N., by whom, also, the proof sheets were collated with the original records.

Horizontal and vertical diameters deduced from the observations and compared with the Nautical Almanac tables, pages 333–341.

The horizontal diameter of Mars, from observations with the equatorial, is found by obtaining the mean interval between the transit of each of the limbs and the comparing star for the night, together with the mean of the times of transit of the limbs, and applying to the arc equivalent of the difference of the former the variation of the planet in right ascension during the period embraced by the latter. As the observations were made only near the opposition of Mars, no correction has been applied for defective illumination of either limb.

In the same manner the vertical diameters are deduced by comparison of the differential declinations of the planet's limbs and star, increased or diminished by the variation of declination in the interval between the means of the times at which the measures were made. To the result, a further correction is applied for thickness of the micrometer wire.

The mean apparent error of the Nautical Almanac, resulting from a comparison of each night's observation with its tabulated diameters, is:

Planet Mars.

	No. of observations.	Horizontal diameter.	No. of observations.	Vertical diameter.
		"		"
Series 1849–'50	54	—2.349	55	—2.862
Series 1851–'52	77	—1.504	81	—0.379
Mean	131	—1.926	136	—1.620

The vertical diameters of Venus have been obtained in three modes: first, as were those of Mars, just explained; second, by direct measurement with the micrometer screw of the equatorial; and third, by the micrometer screw of the meridian circle whilst passing the field of that instrument. The magnifying power of the equatorial generally used was 150, sometimes 235; that of the meridian circle more frequently 144, though occasionally no more than 79. No correction has been applied to measurements with the latter instrument for thickness of the micrometer wire. A mean of the separate results from the several methods is as follows:

Planet Venus.

	No. of observations.	Meridian circle.	No. of observations.	Equatorial direct measure.	No. of observations.	Equatorial inferred.
		"		"		"
Series of 1850–'51	35	—1.174	10	—0.965	4	—1.268
Series of 1852	45	—1.505	8	—2.055	26	—1.383
Mean of	80	—1.340	18	—1.510	30	—1.325

The corresponding observations made at other observatories, and communicated in accordance with the solicitation contained in the ephemeris referred to, pages xxviii, xxix, have also been printed at length in subsequent pages.

Believing that a discussion of the solar parallax from observations thus made, by one thoroughly competent yet wholly uncommitted respecting the comparative value of the deducible result, would be appreciated and approved by astronomers, Dr. B. A. Gould, Jr., was solicited to undertake the task, and, having very considerately consented to do so, all the MS. sheets, as prepared for the printer, were placed in his hands during the month of June, 1855.

J. M. G.

Washington, *January* 1, 1856.

THE SOLAR PARALLAX,

DEDUCED

FROM OBSERVATIONS OF THE U. S. N. ASTRONOMICAL EXPEDITION,

UNDER LIEUTENANT J. M. GILLISS,

BY

B. A. GOULD, Jr.

THE SOLAR PARALLAX.

§1. INTRODUCTORY AND HISTORICAL.

The motives which prompted the observations forming the basis of this discussion have been so fully developed by the astronomer under whose direction the expedition was conducted, and the method of investigation contemplated has been so thoroughly explained, that no farther consideration of these subjects seems required or appropriate.

The measure of the sun's distance has been well called by the Astronomer Royal of England the noblest problem in astronomy. This distance, known or unknown, is, and must ever be, the standard length in which every linear measure of a celestial object beyond the moon is directly or indirectly expressed; whether it be the distance of a satellite, a comet, or a fixed star; the dimensions of a planet, or the gauge of a nebula. It is the astronomical unit; and every stellar distance is only known as a proportional one, until this unit is established. It is, therefore, manifestly the duty of astronomers to flinch from no labor which gives a remote prospect of increasing the precision of our measurement of this fundamental quantity. The materials now presented for the discussion are the fruit of a national expedition, instituted at the advice, and with the approval, of the nation's ablest astronomers. To their attainment three years were dedicated by the zeal of the leader in the enterprise and his unwearied assistants, and astronomers in other lands have contributed. No pains ought to be spared in deducing from them all that they can be made to yield in furtherance of the end for which they were designed. This consideration has been kept steadily in view, and is a sufficient reply to any criticism which may attribute over-refinement to the numerical computations, or too great minuteness to the combinations of the materials under discussion.

When Keppler, after extended study of Tycho's observations, arrived not later than 1620, at the conviction* that the solar parallax could not exceed 1′, he attributed to the sun a distance more than three times greater than philosophers had previously supposed†, although his own limit was but one-seventh part as remote as we now know that it should have been. He had, in 1609, in his book‡ on the motion of *Mars*, called it difficult to fix the distance more exactly than between 700 and 2,000 semi-diameters of the earth, (corresponding to a parallax between 1′ 45″ and 4′ 55″,) and in his Ephemerides§ for 1617 and 1618, he had supposed the parallax to be 2′ 29″, according to Tycho Brahe, who deduced it from observations of the moon.‖ Peter Crüger, Keppler's intimate friend, upbraided him for removing the sun "to such a huge distance,"¶ which would destroy the value of all Tycho's tables, after he had himself adopted the Tychonian value in the Ephemeris a few years before; but Keppler replied** that he had studied the subject with care, and did not hesitate to reduce Tycho's parallax by 1′ 40″, or two-

* *Epitome Astronomiæ Copernicanæ*, pp. 478–480, 486–490.

† RICCIOLI, *Almagestum Novum*, I., 107. TYCHO BRAHE, *Progymn.*, pp. 97, 415, 463.

‡ *De Motibus Stellæ Martis*, p. 71.

§ RICCIOLI, *Almag. Nov.* I, 108. HANSCH, *Epistolæ ad* J. KEPPLERUM, p. 473.

‖ GASSENDI, TYCHONIS *Vita*, p. 102.

¶ IBID. pp. 473–4. CRÜGER to KEPPLER, 1624, July 15.

** Letter to PETE CRÜGER, 1624, September 9. HANSCH *Epist.* p. 455.

thirds of its whole amount. His estimated distance of the sun was 3,592 earth's semi-diameters,* but, for the roundness of the number, he adopted 3,600, corresponding to a parallax of 49″.

Godefridus Wendelinus, (Godfrey Wendelin,) a Belgian astronomer, deduced, in 1647, from morning and evening observations of the moon,† the value of the solar parallax as 15″ at the outside, or the distance at least 13,740 terrestrial semi-diameters, and fixed 14,656 of these semi-diameters as the most probable value. Ricciolus, rejecting this comparatively small value, arrived at the conclusion,‡ in 1665, that a value between 28″ and 30″ could deviate only by very few seconds from the truth.

Ricciolus gives an interesting list of the successively adopted values,§ a tabular view of which is as follows, the references having been verified or corrected in all cases where I have access to the originals, which has been generally the case, and in some instances made more complete.

Distance of the sun from the centre of the earth, expressed in terrestrial semi-diameters.

Authority.	Mean distance.	Authority.
From Hipparchus' data	1472	
or	1379	
Posidonius, (apogee)	13141	Plinus, Lib. II., cap XXII. Ed. Siilig I., 130 [1.]
Ptolemy and Maurolycus	1168	Almagest, Lib. III., c. iv.; V., c. XV.; Maur. Cosm.
Clavius, Barocius	1168	Clavius, Comm. in Sphær., p. 215; Barocius Cosmogr. I. 48.
Albategnius and Alphonso	1107	Albategn, capp. XXVIII. XXX. L.; Alph. Tabb.
Lansberg, from data of Albategnius, (apogee)	7936	MS. letters to Ricciolus.
Alfraganus	1215	Alfragani Rud. Astron.; Different. XXI.
Jno. Fernelius	1256	Cosmotheoria, Lib. I., cap. 7.
Copernicus, Maginus	1142	Cop. de Rev. IV., capp. 19, 21; Magin. Nov. Cæl. Orb. Theor. I., cap. 3, II. cap. 24.
Lansberg, from data of Copernicus, (apogee)	942	apud Ricciolum.
Michael Neander	1160	Sphæra Mundi, p. 124.
Mæstlinus	1160	Appendix ad Keppleri Myst. Cosm., p. 168.
Jno. Offusius	1152	De Divina Astrorum Facaltate.
Tycho and Blancanus	1150	Tycho, Progymn, (Ed. 1648,) pp. 5, 101, 275, 296, etc. Blancanus, Sphæra Mundi, Lib. X., cap. 1.
Longomontanus	1288	Astr. Danica, p. ii., pp. 171, 231, 241, 298.
Keppler, [3] in Ephemerides	1768	p. 2.
Stella Martis	1768	Chapter XXX., p. 162.
Stella Nova	1432	Cap. XVI.
Epit. Astron., (apogee)	3469	Lib. IV., 485, 490.
Tab. Rudolphin	3381	Præcept. 141, p. 98. Tabb., p. 92.
Lansbergius, (min. eccentricity)	1499	Proleg. Uranometriæ; Lib. II., Elem. 11.
Ism. Bullialdus	1460	Astron. Philolaica, Lib. IV., cap. i.
Athanasius Kircherus	1906	Ars Magna Lucis et Umbræ, Lib IX., Probl. 9.
Anton. Maria de Rheita	2000	Radius Sidereomysticus, p. 20, Lib. iv.
Wendelinus	14656	Idea Tabb. Atlant., in Eclips. Lun.; MS. letters to Ricciolus.
Galileo	1208	Dialog. III., de Syst. Mundi; Syst. Cosm., p. 266.
Marius Bettinus	1145	Apiaria Univ. Phil. Math.; Apiar. X.
Langrenus	3420	MS. cited by Ricciolus.
Ricciolus	7327	Almag. Novum I., 731.
Ricciolus, (in round numbers)	7300	

[1] See LALANDE'S *Traité d' Astronomie* II. 402, 3. [2] *Sua hinc sumpsit Censorinus de die natali* 13. Sillig. *Plinius* I, 129.
[3] RICCIOLI, *Lib.* III, *Schol.* II, p. 111.

The next attempts at determining the parallax were those of Cassini and Richer. The latter astronomer was sent by the French Academy to South America for purposes similar to those which prompted in our days this present expedition of Lieutenant Gilliss. His observations were published‖ in 1679, after his return, and his declinations of *Mars* were compared by

* *Ibid.*, p. 456.

† RICCIOLI *Almagestum Novum*, I, 109, 731. WEIDLER *Hist. Astr.* p. 457. See also his letter GASSENDI *Op.omn.* VI, 464.

‡ RICCIOLI *Alm. Nov.*, I, 110, 731, 734.

§ Cf. PLUTARCH *de placitis Philosophorum* lib. II, cap. 31. Aristarchus Propos. 7.

‖ *Observations astronomiques et physiques faites en l'Isle de Cayenne, par* M. RICHER, Paris, 1679. Also *Mém. de l'Acad. Roy. des Sciences*, VII, Pl. 1, p. 233.

Cassini,* with the contemporaneous observations† of himself, Picard, and Roemer, at Paris and Brion, in order to deduce a better value for the parallax. The planet had been compared, both at Cayenne and Paris, with ♆ *Aquarii*, but Cassini did not succeed in obtaining any good value, farther than deducing an upper limit of 9″, if the observations were to be trusted. In 1684, however,‡ Cassini published a memoir revising his computation from the materials and from correspondent observations, 1672, September 5, 9, and 24, deduced as the equatorial horizontal parallax of *Mars*, $25\frac{1}{3}'' \pm 3''$, corresponding to a solar parallax of $9''.5 \pm 1''$, or a distance from the earth of 21,600 terrestrial semi-diameters,§ and with a possible error of 2,000 or 3,000 semi-diameters. From these values he inferred the true diameter of the sun to be just one hundred times that of the earth.

About the same period, Cassini, with Roemer and Sedileau, tried‖ the method of parallaxes in right-ascension, proposed by Cassini himself, and employed by him to ascertain the distance of the comet of 1680. He proposed, from a comparison of the observed right-ascensions of the celestial body on opposite sides of the meridian, to deduce the amount of its geocentric parallax; but this attempt, though laboriously carried out, was entirely unproductive of satisfactory results. Observations were made at the same time by La Hire,¶ but without convincing him that the parallax was sensible, as Lalande infers,** from the fact that La Hire, in his well known tables,†† published in 1687 and 1702, never employed a larger value than 6″.

Flamsteed, who had been, during the same period, observing in England, fixed the upper imit of the parallax of Mars first‡‡ at 30″, and then§§ at 25″, so that the solar parallax could not exceed 10″, or 21,000 terrestrial semi-diameters.

The transit of *Mercury*, 1677, October 28, was observed at St. Helena by Halley, who obtained‖‖ 45″ as the resultant parallax, but attributed but little weight to the determination-preferring a value between 10″ and 20″. The arguments of Streete in favor¶¶ of a value 15″ are cited by Halley with apparent approval, and are very curious. In this connexion, Halley again urged the great advantage of the transits of *Venus* for the determination of this important quantity,*** as he had already done††† in 1691.

La Caille's astronomical expedition to the Cape of Good Hope took place in 1740. Animated by the encouraging example of Richer, he founded an astronomical shrine in the southern hemisphere, which has since been rendered even more illustrious by the labors of such men as Henderson, Herschel, Fallows, and Maclear, offering an example well deemed worthy of imitation by our younger land.

La Caille made a large number of observations of the declination of *Mars* at opposition; and from a comparison of these with corresponding measurements in the northern hemisphere, extending through about six weeks, deduced the value of the solar parallax as 10″.2.

In the succeeding year, 1741, he repeated the investigation, and with a result not essentially different. The mean of four correspondent observations of *Venus* at her inferior conjunction in 1751 was similarly computed by La Caille, giving 10″.38 as the mean value, and, from the whole series‡‡‡ of investigations, he arrived at the conclusion that the horizontal equatorial

* *Recueil d'Observations faits en plusieurs voyages, &c.*, Paris, 1693. *Rec. de Mém. de l'Acad.* VII, P. 1, pp. 353–5.

† *Mém. de l'Acad. Roy. des Sciences*, VII, P. pp. 331, 351.

‡ *Mém. de l'Acad. Roy. des Sciences*, VIII, p. 55.

§ *Mémoires de l'Acad. Roy. des Sciences*, VII, p. 115.

‖ Ibid., pp. 105–7.

¶ Ibid., p. 111.

** Lalande, *Astron.* II, p. 413.

†† La Hire, *Tabulæ Astronomicæ*, p. 6

‡‡ Phil. Trans. 1672, No. 89, pp. 5118.

§§ Phil. Trans. 1673, No. 96, p. 6100, (erroneously printed 6000.)

‖‖ Phil. Trans., No. 193, p. 511. I have not access to Halley's Southern Catalogue of Stars, in which are given his observations of the transit of Mercury.

¶¶ See Lalande's *Astronomie*, § 1729, II., 409; *Astron. Carolina*, ed. 1661, p. 12; ed. 1710, p. 34.

*** Phil. Trans., 1716, p. 454.

††† Phil. Trans. 1673, No. 93, p. 519.

‡‡‡ *Mém. de l'Acad. des Sciences*, 1748, 601; 1751, 310; 1760, 73. See also Cassini de Thury, 1760, 292.

parallax of the sun may be assumed as $10\frac{1}{4}''$ without danger of an error exceeding $0.''25$, thus attaining* a most remarkable accordance with the results at which Cassini and Flamsteed had arrived in the previous century.

About 1760, Tobias Mayer struck out a new path, and deduced a value for the solar parallax by means of the lunar theory. One of the equations for the perturbation in longitude depends on the simple angle between sun and moon, and the coefficient had been, up to that time, determined by the employment of $10''.8$, as the amount of the solar parallax, which forms one factor. Mayer, however, comparing† theory with observations, deduced empirically a new value for the coefficient, whence he obtained $7''.8$, which determination he esteemed subject to an error of one twenty-fourth part, at the outside, since the co-efficient $1'\ 55''$, upon which it depended, could not be in error by more than $5''$.‡

The transits of *Venus*, in 1761 and 1769, had long been awaited by astronomers with intense interest, and were regarded throughout the world as the best means available for accurate determination of the dimensions of the orbit of the earth, and of the value in terrestrial measures of the unit in which celestial measures are necessarily expressed. A concise narration of the efforts made to procure accurate data, and of the materials collected, may be found in the masterly and standard discussion of the problem by Encke.§

The English sent‖ Maskelyne to St. Helena; and Mason and Dixon, the same who subsequently measured the arc of a parallel in America, were destined to Sumatra. Fortunately, they were so much delayed that, in their apprehension lest they might not arrive in season at their appointed station, they decided to observe at the Cape of Good Hope, a more desirable situation, as the event proved. The French Academy sent the astronomer Pingré to the island Rodrigues, a little more than 300 miles from Mauritius, in the Indian ocean. Le Gentil was to have observed at Pondicherry, but the war deprived him of the means, inasmuch as the ship containing his instruments was captured by the British. Another French astronomer, Chappe, was sent by the St. Petersburg Academy of Sciences to Tobolsk, in Siberia, and a Russian astronomer, Rumowski, to Selinghinsk, near Lake Baikal, on the Mongolian frontier. Besides these regularly organized expeditions, astronomers were everywhere on the alert. Not only throughout Europe, but at the missionary stations of southern and eastern Asia, observations of the ingress and egress of the planet were made with all the care and nicety which circumstances permitted. The various results deduced, there is no need of fully recapitulating here.¶

They were far from harmonious, and led to much warm controversy, which, indeed, almost assumed the form of a national dispute. Short obtained, by different methods, different results between $8''.47$ and $8''.67$, and adopted the value $8''.65$ as final. In a second memoir he arrived at the values $8''.49$ and $8''.63$. Pingré found, on the other hand, $10''.1$; Rumowski, $8''.33$; Hornsby, $9''.5$ to $10''$; Audifredi, ("*Dadeius Ruffus*,") $9\frac{1}{4}''$. To sum up, the transit of 1761 did not contribute much to our knowledge of the astronomical unit.

The transit of 1769 promised better results for many reasons. The uncertainty of the values from the first transit stimulated to the greatest possible effort, which was also insured by the consciousness that more than a century must elapse before another similar opportunity would present itself; and beside all this, the transit itself was, upon the assumption that the most advantageous points for observation would be occupied, (as in fact they were,) still further more favorable than its immediate predecessor. Both ingress and egress were visible at numerous

* *Mém. de l'Acad. des Sciences*, 1760, 93.

† *Theoria Lunæ*, §50, p. 50.

‡ Ibid., §51, p. 52

§ *Die Entfernung der Sonne von der Erde, aus dem Venusdurchgang von* 761, *hergeleitet von* J. F. Encke, Gotha, 1822.

‖ Encke, *Entf. d. Sonne*, §5, pp. 11–32.

¶ See, among others, Short, Phil. Trans., 1762, p. 611; 1763, 300. Pingré, *Mém. de l'Acad.*, 1761, pp. 413, 483; 1764, p. 339; 1765, p. 1. Hornsby, Phil. Trans., 1763, p. 467. Rumowski, *Nova. Comm. Acad. Petrop.* XI, *Hist.* p. 41, *Mém.* pp 483, 487, XII, 575. Planmann, *Ventensk. Akad. Handl.*, 1763, 118; 1764, 144. Phil. Trans., 1768, 107. Audifredi, *Investigatio Parallaxis Solaris*, Rome, 1765. Audifredi, *de Solis Parallaxi*, Rome, 1766.

and widely remote points, which was not the case in 1761. Finally, an eclipse of the sun followed close after the transit, affording an excellent opportunity for fixing the longitudes of the places of observation.

No exertions were spared by the votaries or protectors of astronomy for obtaining numerous and accurate observations, and as Encke has said,* with as much truth as delicacy, "whatever may be the future judgment as to the actual issue, posterity will never be able to reproach either the astronomers or the governments of that period with having neglected to call sufficiently careful attention to the more important points, or with having failed to further and support scientific efforts with sufficient readiness." No one will deny that the enlightened aid of national resources, and the generous enthusiasm of astronomers, were alike necessary for providing those materials which, in the hands of the illustrious astronomer of Berlin, have furnished the definite value with which the world has been amply content for more than a quarter of a century, and which may not impossibly remain the standard for a quarter of a century to come.

The observations and disquisitions called forth by this rare and now peculiarly important phenomenon are far too numerous for full citation.† The chief observations were collected by Lalande in a treatise, ‡ from the abundant works in which they were made public, and these, with such as had been omitted there, are given in full detail in Encke's classic investigation§ of this transit.

The value of the parallax found by different astronomers from this transit of *Venus* are confined within much narrower limits than those from the former. The smallest was Planmann's, 8″.43 ; the largest Pingré's, 8″.81, and Euler's, 8″.82 ; Hornsby found 8″.78, Lalande 8″.50, Lexell 8″.68, Smith 8″.605, Maskelyne 8″.723.

The observations were subjected by Ferrer, in 1808, to a discussion, from which he obtained the value 8″.615 ;‖ and in 1815 to a very thorough investigation, posthumously published¶ in 1832, and giving** 8″.577 ± 0″.3 as the result.

Meantime, however, had appeared the two books of Encke, already quoted ; the first published in 1822, containing an ample scrutiny of the observations of the transit of 1761, June 6, and deducing the final value 8″.4905 ± 0″.607 ; and the second, published in 1824, giving a thorough criticism and discussion of the transit of 1769, June 3. In this latter he determines the amount of certain corrections, necessarily disregarded in the first treatise, and finally adopts the following results as final for the solar parallax.

From the transit of 1761..................	8″.5309 ± 0″.0623.
1769..................	8″.6030 ± 0″.0460.
From the two together.....................	8″.5776 ± 0″.0370.

Connected with the transit of 1769 are some circumstances which, from their historical importance, demand some allusion here. One of the most important points for the accuracy of the determination was the station at Fort Wardoehuus, on Wardoe, an island in the Arctic ocean, at the northeastern extremity of Norway. To this point the Danish government had sent a clergyman of Vienna, Father Hell, with two assistants, Sainovicz and Borgrewing. Numerous circumstances tended to throw suspicion on Hell's observations, which he had suppressed for nine entire months, regarding which he had repeatedly seemed to prevaricate, and which, when

* *Venusdurchgang von* 1769, § 1.

† Sufficient are the following memoirs:

Rittenhouse, Trans. Am. Phil. Soc. I. p. 89. Smith, Trans. Am. Phil. Soc. I, p. 162. App. p 54.
Lalande, *Mém. de l'Acad.* 1770, p. 9 ; 1771, p. 776. Hornsby, Phil. Trans. 1771, p. 574.
Pingre, *Mém. de l'Acad.* 1770, p, 558 ; 1772, p. 398. Lexell, *Vetenskaps. Akad. Handl.* 1771, pp. 200, 301.
Maskelyne, Phil. Trans. 1768, p. 55 ; 1769, p. 414. Euler, Phil. Trans. 1772, p. 69.
Maskelyne, Trans. Am. Phil. Soc. I, p. 4. App. p. 1. Planmann, *Vetenskaps. Akad. Handl.* 1772, pp. 183, 358.

‡ Lalande, *Mémoire sur le Passage de Vénus observé le* 3 *Juin*, 1769, Paris ; 1772.

§ *Der Venusdurchgang von* 1769, *&c., bearbeitet von* J. F. Encke, Gotha ; 1824.

‖ Proc. Am. Phil. Soc. VI, p. 355.

¶ Mem. R. Ast. Soc. V, p. 253.

** Mem. R. Ast. Soc. V. pp. 254, 282, 295.

submitted to the test of rigorous computation in combination with the rest, exhibited gross discordances. Many circumstances, of which an account will be found in Encke's second treatise, combined to place Father Hell in a very unfavorable light, and several astronomers, prominent among whom was Lalande, did not hesitate to accuse him of having fabricated or changed his observations. Neither do his demeanor at the time, nor his published observations of the eclipse on the next day, tend to diminish the suspicion;* and the cool investigation† of the case by Encke, after the lapse of considerably more than half a century, leaves his observations and his character under a heavy cloud. The long delay prior to making public his results seemed best explicable by his desire to obtain as many other observations as possible, in order subsequently to give the most plausible figures as his own. Unfortunately for himself, he committed an error in computation,‡ which, like that of his counterpart, the Chevalier d'Angos, sufficed, under the rigorous scrutiny of the master Encke, to secure the ultimate detection of the untruth.

In the year 1834, ten years after the publication of Encke's second treatise, Prof. Littrow, of Vienna, learned§ that some of the papers of Father Hell were in the possession of an Austrian gentleman, the Baron von Münch-Bellinghausen, into whose hands they had come after the death of his uncle, Baron von Penkler, who had been a zealous admirer and patron of Father Hell. In the hope of obtaining some clue to the celebrated Wardoehuus observations, Prof. Littrow asked permission to consult them, which was not only readily granted, but furnished occasion for the presentation of all Hell's MSS. to the Vienna observatory.

Prof. C. L. Littrow entered with care upon the investigation, and was rewarded by the discovery of Father Hell's astronomical note-book for the days June 2–4, 1769. Its contents, with other interesting documents, were soon printed, and appeared at the close of the year. They fully corroborate and justify previous suspicions. The chief figures, especially the times of entrance upon the solar disc, had been for the most part erased, and with a darker colored ink. Two other passages, the one relating to the observations of Sainovicz, the other to those of Borgrewing, had been so thoroughly obliterated, that Prof. Littrow was only able to conjecture the three first letters of the one and the first and last letter of the other. From an investigation of such figures as remained legible and unaltered, he succeeded in finding one observation of the ingress by Borgrewing, and one of the egress by Hell, upon which reliance appears warrantable.‖

The reasons given by Littrow, and unhesitatingly accepted by Encke,¶ are chiefly these. Although, in reply to Lalande, Father Hell had publicly offered to exhibit the original note-book, free from erasures, and giving the observations just as finally published by him, Littrow found both clear and undefaced documents containing the quantities as prepared for publication, and this note-book, which was as manifestly not designed for the press. It contains remarks, notes, and comments, in chronological order; the hand-writing is unequal and frequently changing, observations never made public are here noted down, together with many jottings and memoranda which could not have been intended for the public. The important observations were chiefly obliterated, with great care and thoroughness, as were also sundry remarks concerning them. There can be no doubt that the evidence is sufficient to establish this note-book as being the identical one used at Wardoehuus, and that this establishment of identity discredits the published observations and the truthfulness of Father Hell, but provides few new figures upon which reliance may be placed.

Encke submitted these new-found observations to careful scrutiny within a few months after their discovery. He found that had Father Hell not altered his observations of the eclipse, the times actually observed and originally recorded would harmonize, but that in his desire to

* See Scheibel, *Anleitung zur Mathematische Bucherkenntniss; Stück* 4. App. to the 1st preface to 2d edition.

† *Venusdurchgang von* 1769, pp. 17–20, 24–27.

‡ *Abh. d. Berlin. Acad.* 1835, p. 305.

§ Schumacher, *Ast. Nachr.* XII, p. 71.

‖ *Pater* Hell's *Reise nach Wardoe und seine Beobb. des Venusdurchgangs in Jahre*, 1769, von C. L. Littrow. *Wien*; 1835.

¶ *Abh. der Berlin. Acad.*, 1835, p. 303.

publish better observations than he knew how to make, he had changed his record of the moment of commencement, after computing it by means of elements so erroneous that his published value was out by 40ˢ. Rejecting all observations which had passed under the revision of Father Hell, except in those isolated instances in which the original notes were decipherable and intelligible, Encke redetermined the longitude of Wardoehuus and thus obtained the means of correcting the original equations of condition for the transit of 1769 and solved them anew.

This revised computation gave as the value resulting from the transit of 1769,

$$8''.5931 \pm 0''.0460,$$

being less by 0″.01 than the previous determination from the same transit. Combining this, as before, with the value given by the transit of 1761, he found the mean value

$$8''.57116 \pm 0''.0370,$$

thus decreasing the former value by the comparatively unimportant amount 0″.00644.

This last result has, since 1835, furnished the standard value for the parallax of the sun and corresponding to a mean distance from the earth of 2,406½ terrestrial semidiameters or 82 719 316 equatorial miles.* Assuming with Encke,† the *Toise de Perou* as 6 394 564 feet, or what is equivalent, 1 statute mile = 825 701 toises, Bessel's determination‡ of the earth's dimensions, according to which the length of a quadrant is 5 131 179.81 toises, and the major semi-axis 3 272 077.14 toises, gives for the earth's mean distance from the sun in statute miles

$$95\,360\,000 \pm 412\,000.$$

In 1824, the same year in which Encke's discussion of the transit of 1769 appeared, Professor Burg, like Mayer before him, deduced§ a value of the parallax from the lunar theory, and urged the employment of this method as capable of affording better results than those which could be anticipated from any other method earlier than the *Venus*-transit of 1874. Burg's value, resulting, of course, from a lunar theory more refined than was attainable in the time of Mayer, was 8″.62 = ± 0″.035. Laplace too, in the same manner, obtained‖ the solar parallax from this equation as 26.58 centesimal seconds or 8″.61, a result thoroughly accordant with Encke's determination, and adds, "Il est très remarquable q'un astronome, sans sortir de son observatoire, en comparant seulement ses observations à l'analyse, eût pu déterminer exactement la grandeur et l'aplatissement de la terre, et sa distance au soleil et à la lune; éléments dont la connaissance a été le fruit de longs et pénibles voyages dans les deux hémisphères. L'accord des résultats obtenus par ces deux méthodes est une des preuves les plus frappantes de la gravitation universelle."

A couple of years previous to the discovery of Father Hell's forgeries, Henderson, at the Cape of Good Hope, had made a series of observations¶ of declinations of *Mars*, during the opposition of 1832, which he compared with simultaneous observations at Greenwich, (two instruments, the mural circle by Troughton, and that by Jones,) Cambridge, and Altona. The several resultant values** were 9″.076, 9″.343, 8″.588, and 9″.028, and the final mean by weights†† gave him 9″.028. All these values are larger than either of Encke's adopted ones, and their great discordance precludes reliance upon any of them.

The method proposed by Professor Gerling for obtaining a still closer approximation to the actual value of the solar equatorial parallax has been already developed, with full statements of its relative advantages, both by the astronomer who suggested it‡‡ and by the one under whose direction the Astronomical Expedition to Chile was organized and carried out.§§ The history

* *Berlin Astr. Jahrb.* 1852, p. 323.

† Dove, *Maass und Messen.* p. 39. Encke, *Berl. Ast. Jahrb.* 1852, *p.* 321.

‡ *Astr. Nachr.* XIX, 97.

§ *Astr. Nachr.* III, pp. 346, 348.

‖ *Système du Monde, Liv.* IV, *Œuvres* VI, p. 264.

¶ *Astr. Nachr.* X, p. 152.

** *Astr. Nachr.* XI, pp. 296, 404.

†† *Ibid.* p. 404. Monthly Notices R. Astr. Soc. III, 39.

‡‡ *Astr. Nachr.* XXV, p. 363, XXVI, p. 195.

§§ Introd. to this volume, and A. N.

of this enterprise has been given by Lieutenant Gilliss in the introduction to the present volume.* It now only remains to make use of the results of the expedition.

§2.—GENERAL STATEMENT OF THE PROBLEM.

The proof-sheets of the present volume III of the observations of the planets *Mars* and *Venus*, constituted the materials placed in my hands by Lieutenant Gilliss for the determination of the best value of the solar parallax which they would afford. The end to which he had devoted so much earnest and self-sacrificing effort, and for which he had labored so zealously through obstacles and disadvantages of almost every description, and the scrupulous care manifestly bestowed by him and the assistant astronomers upon the observations, demanded commensurate exertions for the deduction of the final result—an amount of labor uncontemplated in the original plan of the observations, and necessarily entailing a delay of several months.

The observations of *Mars* and *Venus*, made at the Santiago Observatory, by Lieutenant Gilliss, and under his direction, are in perpect conformity with the plan previously laid down, and consist of four series of micrometric comparisons, comprising two oppositions of each planet:

The first series for *Mars* consists of observations on 46 different days, between 1849, December 10, and 1850, January 31.

The first for *Venus* contains observations on 51 different days, between 1850, October 19, and 1851, February 10.

The second for *Mars*, observations on 93 days, from 1851, December 16, to 1852, March 15.

The second for *Venus*, on 27 days, from 1852, May 29, to 1852, September 13.

Making in all observations upon 217 days, extending over nearly three years.

For combinining with these, according to the contemplated method, which requires a comparison in declination with the same star, upon the same date at a northern observatory, correspondent observations were found as follows:

By the Naval Observatory at Washington.

Mars, I. series; *nine.*
Mars, II. series; *two.*
Venus, I. series; *eight.*

By the Royal Observatory at Greenwich.

Mars, I. series; *four.*

By the Harvard Observatory at Cambridge.

Mars, I. series; *five.*

In all, therefore, there were but twenty-eight† correspondent observations for both planets during these three years, eighteen of these being during the first *Mars* series, and two during the second; while for *Venus*, the planet especially selected, there were eight during the first, and none during the second opposition. The details of these correspondent observations are as follows:

* See *Astr. Nachr.* XXXI, p. 247, XXXIV, p. 340, XXXVI, p. 77.

† The Washington observation of 1850, October 19, has been rejected by the advice of Mr. Ferguson.

WASHINGTON OBSERVATIONS.

Planet.	Series.	Date.	No. of comparisons.		Remarks of observer.
			North limb.	South limb.	
		1849.			
Mars	I.	Dec. 12	7	8	Planet disturbed and blazing; star of comparison scarcely visible.
		17	16	22	Three comparisons N. limb good. During remainder, planet blurred and restless.
		27	20	22	Comparisons at times quite unsatisfactory.
		31	12	13	Observations unsatisfactory. Planet and star blurred and tremulous.
		1850.			
		Jan. 9	7	7	Night misty; star of comparison scarcely visible.
		12	6	8	Planet blurred. Interrupted by clouds.
		14	2	2	Night very unfavorable.
		22	10	11	
		29	3	3	
		1850.			
Venus	I.	Oct. 22	5	4	Disc tremulous, and not measurable within ten seconds.
		Nov. 1	4	4	Brown haze.
		2	8	8	
		10	2	3	Three comparisons good, the rest unsatisfactory.
		13	4	4	Night uncommonly fine; all the circumstances favorable, except the inequality of the external and interior temperatures.
		14	4	4	
		21	10	11	Night clear and serene.
		1851.			
		Jan. 15	16	16	Planet flickering and undefined.
		1852.			
Mars	II.	Jan. 24	5	7	Planet indistinct and blazing.
		Feb. 2	8	8	Toward end of observations planet blurred and uncertain.

GREENWICH OBSERVATIONS.

Planet.	Series.	Date.	No. of comparisons.		Remarks of observer.
			North limb.	South limb.	
		1849.			
Mars	I.	Dec. 15	3	3	Passing clouds, the observations not good.
		27	6	6	
		1850.			
		Jan. 4	3	3	The star extremely faint and difficult to observe, the limbs of the planet badly defined.
		7	3	3	Mars was very tremulous, and the star exceedingly faint.

CAMBRIDGE OBSERVATIONS.

Planet.	Series.	Date.	No. of comparisons.		Remarks of observer.
			North limb.	South limb.	
		1849.			
Mars	I.	Dec. 17	4	0	High wind; atmosphere very much disturbed.
		27	5	0	
		31	0	4	
		1850.			
		Jan. 1	9	2	
		4	4	0	

These are the only observations at hand for combining with the magnificent series of Lieutenant Gilliss, according to the method suggested by Professor Gerling, and contemplated by the expedition. It is impossible to refrain from the expression of deep regret that, from all the observations of the well equipped and richly endowed observatories of the northern hemisphere, so few materials could be found toward rendering available, according to its original purpose, an expedition to which so much labor and enthusiasm had been consecrated, and to which an accomplished observer, already known for the precision of his measurements, had devoted his entire energies during so long a sojourn; moreover, after the preparation and wide dissemination of ephemerides and charts of the comparison stars for both the planets during the whole period.

The deduced corrections to Encke's values of the solar parallax corroborated the inferences deducible from the notes, and made palpable the necessity for a recourse to some other method than the desired one of correspondent observations. These corrections, of which the detailed computations will be given, have been found to result as follows, from the correspondent observations already cited:

CORRECTIONS TO ADOPTED SOLAR PARALLAX RESULTING FROM CORRESPONDENT OBSERVATIONS.

I. Washington and Santiago.

	Date.	$\Delta\varpi$.		Date.	$\Delta\varpi$.
	1849.	″		1850.	″
Mars	Dec. 12	+1.445	Venus	Oct. 19	+[18.264]
	12	+2.928		22	+ 0.341
	17	+0.113		Nov. 1	+ 1.214
	27	+0.497		2	+ 1.051
	31	+2.144		10	+ 0.930
	1850.			13	+ 1.236
Mars	Jan. 9	−2.462		14	+ 0.184
	12	+0.534		21	− 0.182
	14	−0.026		1851.	
	22	+1.266		Jan. 15	+ 0.377
	29	+1.390			
	1852.				
Mars	Jan. 24	−0.482			
	Feb. 2	+0.247			

II. Greenwich and Santiago.

	Date.	$\Delta\varpi$.		Date.	$\Delta\varpi$.
	1849.	″		1850.	″
Mars	Dec. 15	−0.574	Mars	Jan. 4	−1.587
	27	−0.598		7	1.636

III. Cambridge and Santiago.

	Date.	$\Delta\varpi$.		Date.	$\Delta\varpi$.
	1849.	″		1850.	″
Mars	Dec. 17	−0.069	Mars	Jan. 1	+0.917
	27	−0.189		4	−0.375
	31	+0.148			

The large mean error, and striking non-accordance of these results, renders any reliance upon them impossible; and the only course remaining has been to make use of the largest

possible number of observations of every kind in each hemisphere, and to trust to the accumulation of observations for eliminating the inaccuracies due to erroneous assumptions in the adopted positions of the comparison stars, and to the unavoidably large mean error of the meridian declinations. This course has been pursued, and, without any attempt to refute the objections which may fairly be urged, the present discussion aims simply at deducing the best result from the materials at hand, in the hope that whatever be the degree of trustworthiness attributed to the final determination, this discussion may at least claim to have been based upon the best available data, and to afford, for the result of previous research, the always welcome corroboration which is furnished by different observations and different methods of investigation.

The observations available for this purpose are as follows:

At Santiago	55 micrometric comparisons	of Mars,	I series.
	89	do.	do.	II series.
	79 meridian observations		do.	II series.
	56 micrometric comparisons		of Venus,	I series.
	72 meridian observations		do.	I series.
	27 micrometric comparisons		do.	II series.
	46 meridian observations		do.	II series.
At Washington	22 micrometric comparisons		of Mars,	I series.
	5	do.	do.	II series.
	16	do.	of Venus,	I series.
	6	do.	do.	II series.
At Greenwich	8 micrometric comparisons		of Mars,	I series.
	24 meridian observations		do.	I series.
	36	do.	do.	II series.
	17	do.	of Venus,	I series.
	17	do.	do.	II series.
At the Cape of Good Hope	47 micrometric comparisons		of Mars,	I series.
	47 meridian observations		do.	I series.
	46	do.	do.	II series.
At Cambridge	19 micrometric comparisons		of Mars,	I series.
At Athens	38 meridian observations		do.	I series.
At Cracow	16	do.	of Venus,	II series.
At Kremsmünster	13	do.	of Mars,	II series.
At Altona	2	do.	of Venus,	II series.

A few of these meridian series have been included up to dates somewhat beyond the proper limits, especially when their reduction showed a mean error sufficiently small to warrant the hope of attaining increased accuracy by their employment. A series consisting of five observations of Mars II. at Cracow, only one of which was within the limits of the Santiago observations, were omitted in consequence of the mean error coming out as over 3″. A large part of the Cambridge observations were inapplicable for combination with those at Santiago on account of the observations being confined to a single limb, and still others are incapable of employment on account of the smallness of the comparison star employed, entailing, naturally, an impossibility of identification in any of the catalogues.

Observations of right-ascension only are utterly without avail for our purpose. The Greenwich observations were obtained from the annual volumes of the Royal Observatory, and are, with few exceptions, solely meridional, conformably to the established usage of the observatory.

The only method which remains for making use of these observations to deduce a value of the parallax, is to obtain the declinations of the several comparison stars as well as possible, and with these to endeavor to elicit from the series of differential observations, with equatorial instruments, sufficiently numerous determinations of the planet's declination, at both northern and southern observatories, to authorize the hope that the inaccuracies of the individual star positions may possibly disappear from their combined result. The results of these differential measurements would then be used like determinations of absolute position. The meridian observations at Santiago and Greenwich could be incorporated, with their appropriate weights, so that every observation would be made to contribute to the final result.

The problem before us is then to be distinctly understood as follows: The failure of northern observatories to afford the means necessary for rendering the materials accumulated by Lieutenant Gilliss, at Santiago, serviceable for their intended purpose, or, indeed, for testing the method contemplated, renders the desired computations impossible, and their expected results unattainable, so far as these relate to the measurement of the parallax, although, of course, of the highest value for such purposes as demand no corresponding observations elsewhere.

And what is now proposed is, to combine whatever other contemporaneous observations are at hand with those of Santiago in such manner as to deduce a resulting value for the parallax, without claiming for the results any peculiar pre-eminence, or for the method the advantages which would result from the original plan. Should the value of the solar parallax thus obtained coincide with Professor Encke's value, within the limits indicated by the probable errors, the corroboration thus afforded by a method so widely different will not be without essential importance; while, in the event of the resulting value differing from that furnished by the transit of 1769, the questions and investigations to which the discordance would give rise could not fail to be of great usefulness.

§3.—METHOD PURSUED.

Ephemerides of *Mars* and *Venus* being computed for the two oppositions with all the precision which Lindenau's tables permit, the several declinations found at the several observatories are to be compared with the ephemeris after the requisite corrections for defective illumination have been applied. Each of the residuals will then afford an equation containing the following unknown quantities:

1. The *semi-diameter* at the unit of distance, which we call

$$\varrho = \varrho_0 + \delta\,\varrho,$$

where ϱ_0 denotes the assumed value. The quantity ϱ appears only in its function, the apparent semidiameter, or

$$r = \frac{1}{\Delta}\,\varrho + i,$$

Δ denoting, as usual, the distance of the centre of the planet from the centre of the earth, and i denoting any spurious apparent extension of the semidiameter.

2. The *irradiation*, i, assumed to be of the form

$$i = \frac{1}{\Delta}\,i_0 + i_1,$$

of which the term i_1 is peculiar to the observer and the instrument.

3. The correction q for the *personal equation* of the observer, and for the *thickness of the threads* of the filar micrometer, the influences of these two sources of error becoming inseparable.

4. The correction μ to the adopted value of a revolution of the *micrometer*-screw.

5. The *correction of the ephemeris* in declination

$$(\varDelta\,\delta_0) = \alpha + \beta\,\tau + \gamma\,\tau^2,$$

τ being the time elapsed since the epoch T, assumed near the middle of the series.

6. The sun's equatorial horizontal *parallax*, which we will put

$$\varpi = \varpi_0 + \delta\,\varpi,$$

(ϖ_0 denoting Encke's value 8″.57116,) and which appears only in its function

$$p = k\,\varpi,$$

where k signifies the ordinary coefficient for the error in parallax dependent upon the declination, the hour-angle, the distance, and the geocentric latitude—*i. e.*, if θ be the siderial time.

$$k = \frac{\rho}{\Delta}\,\sin.\ \varphi'\,\frac{\sin.\ (\delta - \zeta)}{\sin.\ \zeta}\,;\quad \tan.\zeta = \tan.\ \varphi'\ \sec.\ (\theta - \alpha)$$

Putting the observed declination of the limb $= \delta$, the computed declination of the centre $= \delta_0$, and the distance traversed by the micrometer thread $= \Delta m$, we have the equation

$$\delta - \delta_0 = \Delta\delta = \pm \frac{1}{\Delta} (\varrho_0 + \delta \varrho + i_0) + \alpha + \beta \tau + \gamma \tau^2 + k (\varpi_0 + \delta \varpi) + \mu \Delta m \pm (i + q)$$

or, written in another form,

$$0 = n + a\,\mathbf{x} + b\,\mathbf{y} + c\,\mathbf{z} + d\,\mathbf{t} + e\,\mathbf{u} + f\,\mathbf{v} + g\,\mathbf{w}$$

where $n = \delta_0 \pm \frac{1}{\Delta} \varrho_0 + k \varpi_0 - \delta$

$a = +1$	$\mathbf{x} = \alpha$
$b = \frac{1}{20} (t - T)$	$\mathbf{y} = 20\,\beta$
$c = \frac{1}{1000} (t - T)^2$	$\mathbf{z} = 1000\,\gamma$
$d = \pm 1$	$\mathbf{t} = i_1 + q$
$e = \pm \frac{1}{\Delta}$	$\mathbf{u} = \delta\varrho + i_0$
$f = \frac{1}{100} \Delta m$	$\mathbf{v} = 100\,\mu$
$g = -k$	$\mathbf{w} = \delta \varpi$

Of the eight terms composing the second member of this equation, the first consists of known quantities, the next three, together with the last, are independent both of the instrument and the observer, while **t**, **u**, and **v** are entirely local in their character. For errors in the adopted star-places, of course no provision can be made, such errors combining with the errors of observation.

In the equations for those observations in which (as should, of course, be the case, at least with *Mars*,) the comparisons of the two limbs are nearly equal in number, and their means nearly contemporaneous; the terms containing **t** and **u** are eliminated from the resultant comparison of the centre, and may be applied exclusively to the determination of the diameter, and of the law and magnitude of the constants of irradiation. So, too, will the term $f\mathbf{v}$ be necessarily omitted from the equations derived from observations not given with sufficient detail. And, finally, the three terms dependent upon the error of the ephemeris would also have been eliminated from those pairs of "correspondent" observations, for which it was the aim of the expedition to provide materials, and by which each couple of comparisons with the same star, at nearly the same time, in both a northern and a southern latitude, would furnish an independent value for the solar parallax.

The simple course thus indicated has been pursued in the present discussion, and appears to be the only method practicable. Some of the more delicate refinements of reduction and computation are necessarily excluded; but the question may well be raised whether, under the peculiar circumstances of the case, these would have added to the precision of the result had their application been possible.

To insure as great accuracy as possible for the data, the published observations, wherever, and by whomsoever made, have been reduced anew; beginning with the crudest form in which they are accessible, and although the Santiago observations were furnished by Lieutenant Gilliss in the printed sheets, as already prepared for the present volume, he has also courteously given full access to the original manuscript note-books for all observations directly or indirectly employed in these computations.

Those observations which have been found available, and are employed in the discussion, are shown in the annexed table, which gives the places of observation and the number of observations of each planet during each series at the respective places.

Available observations.

Place.	Instrument.	Mars I.	Mars II.	Venus I.	Venus II.	Total.
Santiago	Equatorial	55	89	56	27	227
	Mer. circle	—	79	72	46	197
Washington . . .	Equatorial	22	5	16	6	49
Greenwich	Equatorial	8	—	—	—	8
	Mer. circle	24	36	17	17	94
Cape of Good Hope .	Equatorial	49	—	—	—	49
	Mural Circle	47	46	—	—	95
Cambridge	Equatorial	19	—	—	—	19
Athens	Mer. circle	38	—	—	—	38
Kremsmünster . .	Mer. circle	—	19	—	—	19
Altona	Mer. circle	—	—	2	—	2
Cracow	Mer. circle	—	—	—	16	16
Northern	. . . .	111	60	35	39	245
Southern	. . . .	151	214	128	73	568
In all	. . . .	264	274	163	112	813

For each of the eleven series of equatorial observations, the comparison stars are to be determined in order to obtain absolute positions from the relative measurements. Those meridian observations are to be referred to the same category, which are essentially differential comparisons, and, in fact, dependent upon a micrometer. In such cases the relative measurement is almost always accompanied by an observation of the absolute position of the comparison star, which observation is to be used with such other determinations as may be accessible for deriving a final and adopted place from the mean of all, taken by weight.

These absolute positions may then be combined directly with the meridian observations, and we shall then obtain one resultant normal equation for each series and each place of observation, the coefficient f having different signs at the 7 northern and the 2 southern observatories, respectively. Of these normal equations there will be

For *Mars*, I series, 6 — For *Venus*, I series, 4
" II series, 4 — " II series, 4.

The terms containing **t**, **u**, and **v**, must, necessarily, be eliminated from the normals before these can be combined for solution. To this end, they may, in most cases, be approximately determined by means of a different combination of the data employed, and indeed the value of **v** being independent of the object observed, it may be advantageously deduced from the conjoint use of different series of observations.

The only unknown quantities will then be **x**, **y**, **z**, and **w**, the first three being necessarily different for each of the four series.

The means of the several comparisons which constitute a single observation may, by a slight artifice, be so corrected that the influence of the second differences of the parallaxes belonging to these comparisons will be obviated without entailing the necessity of any reduction of the comparisons singly. The period over which the largest series extends is but about five hours, and in all the Santiago observations, which are the only ones sufficiently prolonged to call for any consideration of this point, the comparisons follow one another at intervals so nearly equidistant that we may assume these intervals to be equal without thereby introducing any appreciable error into the correction.

Putting, as before,

the observed apparent declination of the limb $= \delta$
computed true declination of the center $= \delta_0$
parallax in declination $= p$
semi-diameter $= r$

and analogously,

the stars observed apparent declination $= d$

" true " " $= d_0$

we shall have

$$\delta - d = \delta_0 - d_0 - p \pm r + R$$

where R represents the difference of the refractions of the limb and the star, and has always the same sign as $\delta_0 - d_0$.

If we denote by C the sum of the corrections in declination due to the assumed tabular elements, (assumable as constant during any one night's work, and employ ε, the mean error, in the stead of the unknown error actually incurred in each individual comparison, we shall have the observed difference of declination between planet and star

$$\begin{aligned} \varDelta\delta &= \delta - d + C - \varepsilon \\ &= \delta_0 - d_0 - p \pm r + R + C - \varepsilon \end{aligned}$$

one equation of this form being furnished by every comparison. Indicating the time to which the comparison belongs by a subjacent letter annexed to the respective symbols, we have for the time, t, of any one comparison

$$\varDelta\delta_t = \delta_{ot} - d_{ot} - p_t \pm r_t + R_t + C + \varepsilon$$

and so for a given time near the middle of the series, T,

$$\varDelta\delta_T = \delta_{oT} - d_o - p_T \pm r_T + R_T + C + \varepsilon.$$

The difference of these two equations, when developed in series according to the powers of $t - T = \tau$ is

$$\begin{aligned} \varDelta\delta_{ot} - \varDelta\delta_{oT} = &\ \tau D_t \delta_o + \tfrac{1}{2}\tau^2 D_t^2 \delta_o + \ldots\ldots \\ &- \tau D_t\, p - \tfrac{1}{2}\tau^2 D_t^2\, p + \ldots\ldots \\ &\pm \tau D_t\, r \pm \tfrac{1}{2}\tau^2 D_t^2\, r \pm \ldots\ldots \\ &+ \tau D_t\, R + \tfrac{1}{2}\tau^2 D_t^2 R + \ldots\ldots \end{aligned}$$

Let us now take for the time T, the mean of the times of the several individual comparisons, so that

$$n\,T = t' + t'' + t''' + \ldots\ldots t^{(n)}$$

and put

$$n\,\varDelta\delta_{om} = \varDelta\delta_{ot'} + \varDelta\delta_{ot''} + \varDelta\delta_{ot'''} + \ldots\ldots \varDelta\delta_{ot\,(n)}$$

The mean of all the equations furnished by the individual comparisons will be identical with the mean of all the observed equations after subtracting $\varDelta\delta_{oT}$. All the terms of the first order will have disappeared; and the resulting equation will present the form

$$\varDelta\delta_{om} - \varDelta\delta_{oT} = \tfrac{1}{2}\,\Sigma_1^n \frac{\tau^2}{n} \left\{ D_t^2\delta_o - D_t^2 p \pm D_t^2 r + D_t^2 R \right\}$$

Of the two terms which constitute the first member of this equation, $\varDelta\delta_{om}$ is the (given) arithmetical mean of the observed differences in declination, and $\varDelta\delta_{oT}$ the desired true difference of declinations between star and centre of planet at the time T.

Taking the hour as unit of time, and putting $f''(\delta), f''(p), f''(r), f''(R)$, for the second differences of the numerical values of δ, p, r, R, for successive hours, we may be allowed to put also

$$D_t^2\delta_o = f''(\delta),\ D_t^2 p = f''(p),\ \&c.,\ \&c.,\ \text{so that}$$

$$\varDelta\delta_{om} - \varDelta\delta_{oT} = \frac{1}{2n}\Sigma_1^n \tau^2 \left\{ f''(\delta) - f''(p) \pm f''(r) + f''(R) \right\}$$

It is manifest that $f''(R)$ can never become sensible. Of the three other quantities, $f''(\delta)$ and $f''(r)$ are independent of the place of observation and may be obtained directly from the ephemeris, remembering that as this is computed for intervals of a day, its second differences are to be divided by $(24)^2 = 576$.

Before developing the term $f''(p)$ it will be well to examine the maximum of the factor $\frac{1}{2n}\,\Sigma_1^n \tau^2$, and to obtain an expression for this factor, more convenient even if not so rigorous, by assuming that the times of the several individual comparisons are uniformly distributed

about the mean, or follow one another at equal intervals, which is sufficiently near the truth for our purposes.

Let ϑ be the interval of time (in hours) between each pair of successive comparisons, and our factor will become

$$\frac{1}{2n}\Sigma_1^n\tau^2 = \frac{1}{24}\vartheta^2\left(n^2 - 1\right)$$

or since

$$\vartheta = \frac{t^{(n)} - t'}{n - 1}$$

$$\frac{1}{2n}\Sigma_1^n\tau^2 = \frac{1}{24}\left(t^{(n)} - t'\right)\frac{n+1}{n-1}$$

Since the correction sought is only sensible for the more extended series of comparisons, we may almost uniformly substitute unity for $\frac{n+1}{n-1}$ and consequently

$$\frac{1}{2n}\Sigma_1^n\tau^2 = \frac{1}{24}\left(t^{(n)} - t'\right)^2$$

This very simple expression shows that for the longest series of comparisons (which extends over about five hours) the factor is very nearly$=1$; but that in other cases it is a real fraction.

By simple inspection of the ephemerides, we shall find the maximum values of the second differences to be

	Mars I.	*Mars II.*	*Venus I.*	*Venus II.*
$f''(\delta)$	9''.6	14''.9	49''.9	29''.3
$\frac{1}{576}f''(\delta)$	0 .02	0 .03	0 .09	0 .05
$f''(r)$	0 .01	0 .01	0 .04	0 .04

The change in the apparent semi-diameter is thus seen to be certainly insensible, and it is also evident that in declination the influence of these second differences can be possibly perceived only in a few particular cases, occurring in the first *Venus*-series.

Therefore $\varDelta\delta_{oT} - \varDelta\delta_{om} = \frac{1}{24}\left(t^{(n)} - t'\right)^2 f''(p)$

The only quantity remaining for consideration is $f''(p)$, which may be directly obtained by differencing the formulas which represent the parallax in declination, as computed for successive hours, and will easily be found to be

$$f''(p) = \frac{8''.57}{\Delta}\,\rho\cos\varphi'\,\sin\delta\cos(\theta - \alpha)\ 4\sin^2\tfrac{1}{2}\,15^\circ$$

$$= \frac{8''.57116}{\Delta}\,[8.83346]\,\rho\cos\varphi'\,\sin\delta_o\cos(\theta - \alpha)$$

Substituting this value in the expression above, we obtain finally,

$$\varDelta\delta_{oT} = \varDelta\delta_{om} + \tfrac{1}{6}\left(t^{(n)} - t'\right)^2 .8''.57116\ \sin^2\tfrac{1}{2}15^\circ\ \rho\ \cos\varphi\ \frac{\sin\delta_o\cos(\theta - \alpha)}{\Delta}$$

which gives the correction applicable to the mean of the observed differences for the mean time T; the declination, hour-angle and distance from the earth being denoted by δ, $\theta-\alpha$, and Δ; the distance from the center of the terrestrial spheroid and the corrected latitude by ρ and φ'; and the times of the first and last comparisons by t' and $t^{(n)}$ respectively.

If we represent that part of the expression which is constant for the same place by γ, we may write

$$\varDelta\delta_{oT} = \varDelta\delta_{om} + \gamma\left(t^{(n)} - t'\right)^2\frac{\cos(\theta - \alpha)}{\Delta}\sin\delta_o$$

Adopting Bessel's value of the eccentricity of the terrestrial spheroid, so that

$$\log.\ e = 8.9122052,$$

we have, by the ordinary formulas, (*Berl. Astr. Jahrb.* 1852, p. 325,)

$$\rho\sin\varphi' = \frac{a\,(1 - e)^2\sin\varphi}{\sqrt{1 - e^2\sin^2\varphi}}$$

$$\rho\cos\varphi' = \frac{a\cos\varphi}{\sqrt{1 - e^2\sin^2\varphi}},$$

and can construct the following table of geocentric coordinates and constants for the nine observatories which have furnished materials for our discussion :

OBSERVATORY-CONSTANTS.

Place.	L.	φ.	log. ρ.	φ'.	log. γ.	c.
	h. m. s.	° ′ ″		° ′ ″		h. m. s.
Santiago	0 25 53.3	−33 26 25.9	9.999561	−33 15 51.6	8.308139	0 26 39.55
Washington	0 0 0.0	+38 53 39.2	9.999430	+38 42 24.7	8.278006	0 0 50.49
Greenwich	5 8 12.2	+51 28 38.2	9.999113	+51 17 24.6	8.181539	5 8 12.20
Cape of Good Hope	6 22 7.2	−33 56 3.0	9.999550	−33 45 24.0	8.305646	6 21 55.09
Cambridge	0 23 41.5	+42 22 51.5	9.999343	+42 11 23.9	8.255399	0 24 28.11
Athens	6 43 6.4	+37 58 20	9.999453	+37 47 10.5	. . .	6 42 50.85
Cracow	6 28 2.4	+50 3 50.0	9.999149	+49 52 30.0	. . .	6 27 49.32
Kremsmünster	6 4 44.6	+48 3 23.8	9.999199	+47 51 56.8	. . .	6 4 35.34
Altona	5 47 57.4	+53 32 45.3	9.999061	+53 21 45.5	. . .	5 47 50.88

The longitudes (L.) in this table being all easterly from Washington, the negative sign is unnecessary ; φ and φ' denote, respectively, the astronomical and the corrected latitude ; ρ the distance from the centre of the spheroid, expressed in terms of the major semi-axis of the generating ellipse ; γ that part of the coefficient of $\left(t^{(n)} - t\right)^2$ in the expression for $\Delta\delta_{\text{o T}}$, which is constant for the observatory ; and c the constant used in reducing the sidereal time to mean Washington time by means of the sidereal time at Greenwich mean noon, given in the London Nautical Almanac—being the longitude east from Washington, added to the reduction to mean time which belongs to the longitude from Greenwich.

§ 4. EPHEMERIDES AND AUXILIARY TABLES.

The ephemerides here given are derived from Lindenau's tables of *Mars* and *Venus*, and comprise the entire period of Lieutenant Gilliss's observations of each of these planets. Inasmuch as the employment of the ephemerides is, in fact, only differential in character, it did not appear necessary to incorporate the recent modifications and improvements of Lindenau's tables, given by Breen and Peirce. They are consequently accordant with the Nautical Almanac and Berlin Jahrbuch.

The approximate values which have been employed for the semi-diameters at the unit of distance from the earth are—

For *Mars*, $\varrho = 4''.66393$, (Oudemans, *Astron. Nachr.* XXXV, 351.)

For *Venus*, $\varrho = 8''.6625$, (Wichmann, *Astron. Nachr.* XXXII, 74.)

The ephemerides for the two oppositions of *Mars*, and the two inferior conjunctions of *Venus*, here follow in their order.

Ephemeris of Mars for the first series, or opposition of 1849–50.

Washington Mean Noon.

Date.	α.	δ.	log. Δ.	r.	Δh. In $\alpha \cos \delta$.	Δh. In δ.	Def. limb.	log. cos δ.	$\frac{1}{15} r \sec \delta$.
1849.	h. m. s.	° ′ ″		″	″	″			s.
Oct. 30	6 24 13.36	+24 12 36.5	9.8608773	6.42	1.22	0 00	p. n.	9.96002	0.47
31	24 44.78	14 51.9	.8574961	6.48	1.20	0.00	p. n.	.95989	0.47
Nov. 1	25 12.94	17 10.9	.8541218	6.53	1.17	0.00	p. n.	.95976	0.48
2	25 37.74	19 33.4	.8507568	6.58	1.14	0.00	p. n.	.95962	0.48
3	25 59.14	21 59.7	.8474035	6.60	1.12	0.00	p. n.	.95948	0.48
4	26 17.09	24 29.9	.8440644	6.68	1.11	0.00	p. n.	.95934	0.49
5	26 31.49	27 3.9	.8407421	6.73	1.08	0.00	p. n.	.95920	0.49
6	26 42.37	29 41.8	.8374392	6.78	1.05	0.00	p. n.	.95904	0.50
7	26 49.61	32 23.8	.8341584	6.83	1.04	0.00	p. n.	.95889	0.50
8	26 53.18	35 9.8	.8309032	6.88	1.02	0.00	p. n.	.95872	0.50
9	26 53.02	37 59.6	.8276770	6.94	0.99	0.00	p. n.	.95856	0.51
10	26 49.10	40 53.3	.8244831	6.99	0.96	0.00	p. n.	.95840	0.51
11	26 41.39	43 50.8	.8213252	7.04	0.93	0.00	p. n.	.95822	0.52
12	26 29.83	46 52.0	.8182069	7.09	0.90	0.00	p. n.	.95805	0 52
13	26 14.39	49 56.8	.8151317	7.14	0.87	0.00	p. n.	.95786	0.52
14	25 55.08	53 5.0	.8121042	7.19	0.84	0.00	p. n.	.95769	0.53
15	25 31.87	56 16.3	.8091278	7.24	0.81	0.00	p. n.	.95749	0.53
16	25 4.77	59 30.6	.8062088	7.29	0.78	0.00	p. n.	.95730	0.54
17	24 33.78	25 2 47.6	.8033490	7.34	0.74	0.00	p. n.	.95711	0.54
18	23 58.91	6 7.1	.8005538	7 38	0.70	0.00	p. n.	.95691	0.54
19	23 20.18	9 28.7	.7978275	7.43	0.68	0.00	p. n.	.95671	0.55
20	22 37.61	12 52.0	.7951747	7.47	0.61	0.00	p. s.	.95652	0.55
21	21 51.22	16 16.8	.7925995	7.52	0.60	0.00	p. s.	.95631	0.55
22	21 1.08	19 42.7	.7901061	7.56	0.57	0.00	p. s.	.95611	0.56
23	20 7.22	23 9.1	.7876991	7.60	0.54	0.00	p. s.	.95590	0.56
24	19 9.70	26 35.6	.7853827	7.65	0.55	0.00	p. s.	.95569	0.56
25	18 8.58	30 1.9	.7831613	7.68	0.46	0.00	p. s.	.95549	0.57
26	17 3.93	33 27.4	.7810394	7.72	0.44	0.00	p. s.	.95528	0.57
27	15 55.83	36 51.5	.7790213	7.76	0.39	0.00	p. s.	.95508	0.57
28	14 44.37	40 13.7	.7771113	7.79	0.36	0.00	p. s.	.95487	0.58
29	13 29.64	43 33.8	.7753134	7.82	0.33	0.00	p. s.	.95467	0.58
30	12 11.75	46 50.9	.7736317	7.85	0.30	0.00	p. s.	.95147	0.58
Dec. 1	10 50.81	50 4.6	.7720698	7.88	0.27	0.00	p. s.	.95427	0.58
2	9 26.96	53 14.4	.7706328	7.91	0.26	0.00	p s.	.95408	0.59
3	8 0.32	56 19.6	.7693245	7.93	0.22	0.00	p. s.	.95389	0.59
4	6 31.05	59 19.8	.7681485	7.95	0.20	0.00	p. s.	.95370	0.59
5	4 59.29	26 2 14.3	.7671087	7.97	0.16	0.00	p. s.	.95353	0.59
6	3 25.21	5 2.6	.7662083	7.99	0.13	0.00	p. s.	.95335	0.59
7	1 48.94	7 44.3	.7654509	8.00	0.11	0.00	p. s.	.95319	0.59
8	6 0 10.74	10 18.8	.7648398	8.01	0.09	0.00	p. s.	.95302	0.60
9	5 58 30.79	12 45.7	.7643774	8.02	0.07	0.00	p. s.	.95287	0.60
10	56 49.32	15 4.6	.7640662	8.03	0.05	0.00	p. s.	.95272	0.60
11	55 6.52	17 15.2	.7639086	8.03	0.04	0.00	p. s.	.95259	0.60
12	53 22.61	19 17.1	.7639066	8.03	0.03	0.00	p. s.	.95246	0.60
13	51 37.81	21 9.9	.7640617	8.03	0.02	0.00	p. s.	.95235	0.60
14	49 52.39	22 53.3	.7643747	8.02	0.01	0.00	p. s.	.95224	0.60
15	48 6.59	24 27.4	.7648457	8.01	0.01	0.00	p. s.	.95214	0.60
16	46 20.63	25 52.1	.7654747	8.00	0.00	0.00	p. s.	.95205	0.60
17	44 34.76	27 7.4	.7662618	7.99	0.00	0.01	p. s.	.95197	0.59
18	42 49.22	28 13.1	.7672065	7.97	0.01	0.00	f. s.	.95190	0.59
19	41 4.26	29 9.3	.7683075	7.95	0.01	0.00	f. s.	.95184	0.59
20	39 20.10	29 56.1	.7695631	7.93	0.02	0.00	f. s.	.95179	0.59
21	37 36.97	30 33.8	.7709712	7.90	0.02	0.00	f. s.	.95176	0.59
22	35 55.07	31 2 6	.7725294	7.87	0.03	0.00	f. s.	.95173	0.59
23	34 14.61	31 22.8	.7742354	7.84	0.04	0.00	f. s.	.95171	0.58
24	32 35.81	31 34 6	.7760863	7.81	0.05	0.00	f. s.	.95170	0.58
25	30 58.87	31 38.5	.7780789	7.77	0.06	0.00	f. s.	.95170	0.58
26	29 23.96	31 34.7	.7802096	7.74	0.07	0.00	f. s.	.95170	0.58
27	5 27 51.23	+26 31 23.6	9.7824749	7.70	0.08	0.00	f. s.	9.95171	0.57

Ephemeris of Mars for the first series—Continued.

Washington Mean Noon.

Date.	α.	δ.	log. Δ.	r.	Δh. In α cos. δ.	Δh. In δ.	Def. limb.	log. cos δ.	$\frac{1}{15} r$ sec δ.
1849.	h. m. s.	° ′ ″		″	″	″			s.
Dec. 28	5 26 20.84	+26 31 5.8	9.7848713	7.66	0.09	0.00	f. s.	9.95173	0.57
29	24 52.94	30 41.6	.7873948	7.62	0.11	0.00	f. s.	.95175	0.57
30	23 27.68	30 11.5	.7900411	7.57	0.13	0.00	f. s.	.95178	0.56
31	22 5.19	29 36.0	.7928060	7.52	0.15	0.00	f. s.	.95181	0.56
1850.									
Jan. 1	20 45.59	28 55.5	.7956854	7.47	0.17	0.00	f. s.	.95185	0.56
2	19 28.98	28 10.5	.7986754	7.41	0.19	0.00	f. s.	.95190	0.55
3	18 15.47	27 21.5	.8017718	7.36	0.21	0.00	f. s.	.95195	0.55
4	17 5.16	26 28.9	.8049704	7.31	0.23	0.00	f. s.	.95201	0.54
5	15 58.12	25 33.3	.8082667	7.25	0.25	0.00	f. s.	.95207	0.54
6	14 54.44	24 35.1	.8116564	7.20	0.28	0.00	f. s.	.95213	0.54
7	13 54.19	23 34.7	.8151349	7.14	0.30	0.00	f. s.	.95219	0.53
8	12 57.42	22 32.7	.8186977	7.08	0.32	0.00	f. s.	.95226	0.53
9	12 4.19	21 29.4	.8223403	7.02	0.34	0.00	f. s.	.95232	0.52
10	11 14.55	20 25.3	.8260584	6.96	0.36	0.00	f. s.	.95239	0.52
11	10 28.53	19 20.7	.8298474	6.90	0.38	0.00	f. s.	.95245	0.51
12	9 46.17	18 16.1	.8337027	6.84	0.40	0.00	f. s.	.95252	0.51
13	9 7.49	17 11.9	.8376199	6.78	0.42	0.00	f. s.	.95259	0.50
14	8 32.48	16 8.5	.8415945	6.72	0.45	0.00	f. s.	.95266	0.50
15	8 1.15	15 6.0	.8456223	6.65	0.47	0.00	f. s.	.95273	0.49
16	7 33.50	14 4.8	.8496990	6.59	0.49	0.00	f. s.	.95279	0.49
17	7 9.53	13 5.3	.8538203	6.53	0.51	0.00	f. s.	.95285	0.48
18	6 49.22	12 7.7	.8579820	6.47	0.53	0.00	f. s.	.95291	0.48
19	6 32.53	11 12.2	.8621805	6.41	0.55	0.00	f. s.	.95296	0.48
20	6 19.43	10 18.9	.8664121	6.34	0.57	0.00	f. s.	.95302	0.47
21	6 9.89	9 27.9	.8706731	6.28	0.59	0.00	f. s.	.95308	0.47
22	6 3.86	8 39.4	.8749601	6.22	0.60	0.00	f. s.	.95313	0.46
23	6 1.30	7 53.6	.8792697	6.16	0.62	0.00	f. s.	.95318	0.46
24	6 2.17	7 10.5	.8835988	6.10	0.63	0.00	f. s.	.95322	0.45
25	6 6.40	6 30.2	.8879446	6.04	0.65	0.00	f. s.	.95326	0.45
26	6 13.94	5 52.6	.8923044	5.98	0.66	0.00	f. s.	.95330	0.44
27	6 24 74	5 17.7	.8966756	5.92	0.67	0.00	f. s.	.95333	0.44
28	6 38.75	4 45.5	.9010558	5.86	0.68	0.00	f. s.	.95336	0.44
29	6 55.91	4 16 0	.9054427	5.80	0.70	0.00	f. s.	.95340	0.43
30	7 16.16	3 49.1	.9098341	5.74	0.71	0.00	f. s.	.95343	0.43
31	7 39.44	3 24.8	.9142280	5.68	0.72	0.00	f. s.	.95346	0.42
Feb. 1	8 5.71	3 3.0	.9186225	5.63	0.73	0.00	f. s.	.95348	0.42
2	8 34.91	2 43.6	.9230158	5.57	0.74	0.00	f. s.	.95350	0.41
3	9 7.00	2 26.6	.9274062	5.51	0.75	0.00	f. s.	.95352	0.41
4	9.41.92	2 11.8	.9317921	5.46	0.76	0.00	f. s.	.95353	0.40
5	5 10 19.62	+26 1 59.1	9.9361720	5.40	0.76	0.00	f. s.	9.95354	0.40

Ephemeris of Mars for the second series, or opposition of 1851–52.

Washington Mean Noon.

Date.	α.	δ.	log. Δ.	r.	Δh. In α cos δ.	Δh. In .	Def. limb.	log. cos δ.	$\frac{1}{15} r$ sec δ.
1851.	h. m. s.	° ′ ″		″	″	″			s.
Dec. 12	9 9 6.13	+19 33 49.0	9.9126138	5.70	0.69	0.05	p.	9.97418	0.40
13	9 16.94	35 45.2	.9090776	5.75	0.68	0.05	p.	.97409	0.41
14	9 24.63	37 55.6	.9055576	5.80	0.67	0.04	p.	.97399	0.41
15	9 29.16	40 20.3	.9020566	5.84	0.66	0.04	p.	.97388	0.41
16	9 30.48	42 59.2	.8985776	5.89	0.64	0.04	p.	.97376	0.42
17	9 28.54	45 52.5	.8951237	5.94	0.63	0.03	p.	.97364	0.42
18	9 23.31	49 0.3	.8916983	5.98	0.61	0.03	p.	.97349	0.42
19	9 14.76	52 22.4	.8883047	6.03	0.59	0.03	p.	.97334	0.43
20	9 2.85	55 58.9	.8849463	6.08	0.57	0.03	p.	.97317	0.43
21	8 47.56	59 49.7	.8816269	6.13	0.56	0.03	p.	.97300	0.43
22	8 28.86	20 3 54.6	.8783502	6.17	0.54	0.02	p.	.97280	0.44
23	8 6.74	8 13.5	.8751200	6.22	0.52	0.02	p.	.97261	0.44
24	7 41.20	12 46.1	.8719402	6.26	0.50	0.02	p.	.97239	0.44
25	7 12.23	17 32.1	.8688148	6.31	0.48	0.02	p.	.97217	0.45
26	6 39.83	22 31.2	.8657478	6.35	0.46	0.02	p.	.97194	0.45
27	6 4.00	29 43.2	.8627434	6.40	0.44	0.02	p.	.97170	0.46
28	5 24.76	33 7.6	.8598057	6.44	0.42	0.02	p.	.97144	0.46
29	4 42.13	38 44.0	.8569387	6.48	0.40	0.01	p.	.97117	0.46
30	3 56.13	44 31.8	.8541464	6.53	0.37	0.01	p.	.97089	0.47
31	3 6.80	50 30.5	.8514330	6.57	0.35	0.01	p.	.97061	0.47
1852.									
Jan. 1	2 14.17	56 39.7	.8488025	6.61	0.33	0.01	p.	.97032	0.47
2	1 18.29	21 2 58.6	.8462590	6.64	0.31	0.01	p.	.97001	0.47
3	9 0 19.19	9 26.6	.8438068	6.68	0.29	0.01	p.	.96969	0.48
4	8 59 16.94	16 3.1	.8414499	6.72	0.27	0.01	p.	.96937	0.48
5	58 11.61	22 47.3	.8391924	6.75	0.25	0.01	p.	.96904	0.48
6	57 3.25	29 38.5	.8370382	6.79	0.23	0.00	p.	.96870	0.49
7	55 51.93	36 35.9	.8349911	6.82	0.21	0.00	p.	.96835	0.49
8	54 37.74	43 38.7	.8330552	6.85	0.19	0.00	p.	.96800	0.49
9	53 20.78	50 46.0	.8312345	6.88	0.17	0.00	p.	.96764	0.49
10	52 1.15	57 56.9	.8295331	6.91	0.15	0.00	p.	.96727	0.50
11	50 38.97	22 5 10.4	.8279546	6.93	0.13	0.00	p.	.96690	0.50
12	49 14.34	12 25.7	.8265024	6.95	0.11	0.00	p.	.96653	0.50
13	47 47.39	19 41.8	.8251801	6.97	0.10	0.00	p.	.96616	0.50
14	46 18.26	26 57.7	.8239911	6.99	0.08	0.00	p.	.96577	0.50
15	44 47.10	34 12.5	.8229385	7.01	0.07	0.00	p.	.96540	0.51
16	43 14.09	41 25.1	.8220251	7.02	0.06	0.00	p.	.96501	0.51
17	41 39.40	48 34.4	.8212534	7.04	0.05	0.00	p.	.96463	0.51
18	40 3.20	55 39.6	.8206256	7.05	0.04	0.00	p.	.96426	0.51
19	38 25.66	23 2 39.7	.8201439	7.06	0.03	0.00	p.	.96389	0.51
20	36 46.98	9 33.7	.8198102	7.06	0.02	0.00	p.	.96351	0.51
21	35 7.38	16 20.6	.8196254	7.07	0.01	0.00	p.	.96314	0.51
22	33 27.06	22 59.5	.8195900	7.07	0.00	0.00	p.	.96278	0.51
23	31 46.21	29 29.6	.8197045	7.06	0.00	0.01	p.	.96243	0.51
24	30 5.05	35 50.2	.8199693	7.06	0.00	0.01	p.	.96208	0.51
25	28 23.80	42 0.5	.8203842	7.05	0.00	0.01	f.	.96174	0.51
26	26 42.68	47 59.6	.8209485	7.04	0.00	0.01	f.	.96140	0.51
27	25 1.88	53 47.0	.8216610	7.03	0.01	0.01	f.	.96108	0.51
28	23 21.61	59 22.1	.8225200	7.02	0.01	0.01	f.	.96077	0.51
29	21 42.07	24 4 44.4	.8235236	7.00	0.01	0.01	f.	.96046	0.51
30	20 3.45	9 53.4	.8246700	6.98	0.02	0.01	f.	.96018	0.51
31	18 25.96	14 48.8	.8259568	6.96	0.03	0.02	f.	.95989	0.51
Feb. 1	16 49.79	19 30.1	.8273811	6.94	0.04	0.02	f.	.95962	0.51
2	15 15.10	23 57.1	.8289401	6.92	0 05	0.02	f.	.95937	0.51
3	13 42.05	28 9.6	.8306311	6.89	0.06	0.02	f.	.95913	0.50
4	12 10.81	32 7.5	.8324509	6.86	0.07	0.02	f.	.95890	0.50
5	10 41.54	35 50.6	.8343961	6.83	0.08	0.02	f.	.95869	0.50
6	9 14.39	39 18.8	.8364631	6.80	0.09	0.02	f.	.95848	0.50
7	7 49.49	42 32.1	.8386489	6.76	0.10	0.02	f.	.95830	0.50
8	8 6 26.97	+24 45 30.8	9.8409489	6.73	0.12	0.03	f.	9.95812	0.49

Ephemeris of Mars for the second series—Continued.

Washington Mean Noon.

Date.	α.	δ.	log. Δ.	r.	Δh. in $\alpha \cos \delta$.	Δh. in δ.	Def. limb.	log cos δ.	$\frac{1}{15} r \sec \delta$.
1852.	h. m. s.	° ′ ″		″	″				
Feb. 9	8 5 6.97	+24 48 14.6	9.8433597	6.69	0.14	0.03	f.	9.95797	0.49
10	3 49.60	50 43.8	.8458776	6.65	0.16	0.03	f.	.95782	0.49
11	2 34.97	52 58.4	.8484987	6.61	0.18	0.03	f.	.95769	0.49
12	1 23.18	54 58.6	.8512188	6.57	0.20	0.03	f.	.95757	0.48
13	8 0 14.33	56 44.7	.8540339	6.53	0.22	0.03	f.	.95747	0.48
14	7 59 8.51	58 17.0	.8569397	6.48	0.24	0.03	f.	.95737	0.48
15	58 5.79	24 59 35.5	.8599321	6.44	0.25	0.03	f.	.95730	0.47
16	57 6.26	25 0 40.5	.8630070	6.39	0.27	0.03	f.	.95724	0.47
17	56 9.97	1 32.4	.8661602	6.35	0.29	0.03	f.	.95719	0.47
18	55 16.98	2 11.4	.8693875	6.30	0.31	0.03	f.	.95715	0.46
19	54 27.33	2 37.8	.8726847	6.25	0.33	0.03	f.	.95712	0.46
20	53 41.07	2 52.0	.8760473	6.20	0.35	0.03	f.	.95711	0.46
21	52 58.22	2 54.3	.8794711	6.16	0.37	0.03	f.	.95711	0.45
22	52 18.80	2 44.9	.8829520	6.11	0.39	0.03	f.	.95712	0.45
23	51 42.83	2 24.2	.8864859	6.06	0.41	0.03	f.	.95714	0.45
24	51 10.32	1 52.5	.8900685	6.01	0.43	0.03	f.	.95717	0.44
25	50 41.26	1 10.1	.8936958	5.96	0.45	0.03	f.	.95721	0.44
26	50 15.65	25 0 17.3	.8973641	5.91	0.48	0.03	f.	.95726	0.43
27	49 53.46	24 59 14.5	.9010698	5.86	0.50	0.03	f.	.95732	0.43
28	49 34.66	58 1.9	.9048094	5.81	0.53	0.03	f.	.95739	0.43
29	49 19.24	56 39.8	.9085796	5.76	0.55	0.03	f.	.95747	0.42
Mar. 1	49 7.16	55 8.5	.9123771	5.71	0.57	0.03	f.	.95756	0.42
2	48 58.38	53 28.3	.9161986	5.66	0.58	0.03	f.	.95766	0.42
3	48 52.85	51 39.4	.9200413	5.61	0.59	0.03	f.	.95777	0.41
4	48 50.53	49 42.0	.9239026	5.56	0.60	0.03	f.	.95788	0.41
5	48 51.39	47 36.3	.9277799	5.51	0.60	0.03	f.	.95800	0.40
6	48 55.38	45 22.6	.9316708	5.46	0.61	0.03	f.	.95813	0.40
7	49 2.44	43 1.0	.9355728	5.41	0.62	0.03	f.	.95827	0.40
8	49 12.51	40 31.8	.9394838	5.36	0.62	0.03	f.	.95841	0.39
9	49 25.56	37 55.0	.9434017	5.31	0.63	0.03	f.	.95856	0.39
10	49 41.54	35 10.8	.9473246	5.27	0.65	0.03	f.	.95872	0.39
11	50 0.41	32 19.5	.9512505	5.22	0.66	0.03	f.	.95889	0.38
12	50 22.11	29 21.1	.9551776	5.17	0.67	0.03	f.	.95906	0.38
13	50 46.60	26 15.7	.9591043	5.12	0.68	0.03	f.	.95926	0.37
14	51 13.82	23 3.3	.9630290	5.08	0.69	0.03	f.	.95942	0.37
15	51 43.73	19 44.2	.9669501	5.03	0.69	0.03	f.	.95961	0.37
16	52 16.28	16 18.5	.9708659	4.99	0.70	0.03	f.	.95980	0.36
17	52 51.42	12 46.1	.9747748	4.94	0.70	0.03	f.	.96001	0.36
18	53 29.10	9 7.2	.9786755	4.90	0.71	0.03	f.	.96021	0.36
19	54 9.27	5 21.8	.9825666	4.85	0.72	0.03	f.	.96043	0.35
20	7 54 51.88	+24 1 30.1	9.9864469	4.81	0.72	0.03	f.	9.96064	0.35

Ephemeris of Venus for the first series, or inferior conjunction of 1850–51.

Washington Mean Noon.

Date.	α.	δ.	log. Δ.	r.	log. cos δ.	$\frac{1}{15} r$ sec δ.
1850.	h. m. s.	° ′ ″		″		s.
Oct. 16	16 27 26.09	−25 57 22.2	9.7739178	14.58	9.95382	1.08
17	31 22.11	26 8 35.4	.7683047	14.77	.95313	1.10
18	35 16.32	19 15.5	.7626301	14.96	.95246	1.11
19	39 8.57	29 22.4	.7568938	15.16	.95183	1.13
20	42 58.71	38 56.2	.7510955	15.37	.95122	1.15
21	46 46.60	47 56.8	.7452349	15.57	.95065	1.16
22	50 32.09	26 56 24.2	.7393117	15.79	.95011	1.18
23	54 15.03	27 4 18.4	.7333257	16.01	.94960	1.20
24	16 57 55.25	11 39.6	.7272767	16.23	.94913	1.22
25	17 1 32.57	18 27.7	.7211644	16.46	.94868	1.23
26	5 6.83	24 42.9	.7149888	16.70	.94828	1.25
27	8 37.85	30 25.4	.7087498	16.94	.94790	1.27
28	12 5.45	35 35.3	.7024476	17.19	.94756	1.29
29	15 29.43	40 12.9	.6960822	17.44	.94726	1.31
30	18 49.60	44 18.3	.6896537	17.70	.94698	1.33
31	22 5.73	47 51.8	.6831624	17.97	.94675	1.35
Nov. 1	25 17.61	50 53.8	.6766086	18.24	.94655	1.38
2	28 25.03	53 24.4	.6699930	18.52	.94638	1.40
3	31 27.74	55 24.0	.6633164	18.81	.94624	1.42
4	34 25.48	56 52.9	.6565798	19.10	.94615	1.44
5	37 18.03	57 51.3	.6497844	19.40	.94608	1.46
6	40 5.11	58 19.5	.6429320	19.71	.94605	1.49
7	42 46.45	58 17.9	.6360245	20.03	.94605	1.51
8	45 21.78	57 46.8	.6290645	20.35	.94608	1.54
9	47 50.82	56 46.5	.6220548	20.68	.94615	1.56
10	50 13.27	55 17.2	.6149989	21.02	.94625	1.59
11	52 28.83	53 19.2	.6079008	21.37	.94638	1.61
12	54 37.21	50 52.8	.6007649	21.72	.94655	1.64
13	56 38.10	47 58.1	.5935962	22.08	.94674	1.66
14	17 58 31.19	44 35.5	.5864006	22.45	.94696	1.69
15	18 0 16.19	40 45.2	.5791847	22.83	.94722	1.72
16	1 52.80	36 27.2	.5719560	23.21	.94750	1.75
17	3 20.74	31 41.6	.5647227	23.60	.94782	1.77
18	4 39.72	26 28.4	.5574940	24.00	.94816	1.80
19	5 49.45	20 47.7	.5502797	24.40	.94853	1.83
20	6 49.65	14 39.5	.5430907	24.81	.94893	1.86
21	7 40.07	8 3.7	.5359386	25.22	.94936	1.89
22	8 20.49	27 1 0.1	.5288359	25.63	.94982	1.92
23	8 50.67	26 53 28.6	.5217964	26.05	.95030	1.95
24	9 10.43	45 29.0	.5148347	26.47	.95081	1.98
25	9 19.61	37 1.1	.5079666	26.90	.95135	2.01
26	9 18.07	28 4.6	.5012093	27.32	.95191	2.03
27	9 5.71	18 39.0	.4945810	27.74	.95250	2.06
28	8 42.48	26 8 44.0	.4881006	28.16	.95312	2.09
29	8 8.36	25 58 19.3	.4817880	28.57	.95376	2.12
30	7 23.39	47 24.9	.4756642	28.97	.95444	2.14
Dec. 1	6 27.65	36 0.5	.4697512	29.37	.95513	2.17
2	5 21.30	24 5.9	.4640717	29.76	.95584	2.19
3	4 4.58	25 11 41.0	.4586491	30.13	.95659	2.22
4	2 37.79	24 58 46.1	.4535072	30.49	.95734	2.24
5	18 1 1.31	45 21.4	.4486698	30.83	.95813	2.26
6	17 59 15.59	31 27.5	.4441610	31.15	.95894	2.28
7	57 21.19	17 5.4	.4400052	31.45	.95976	2.30
8	55 18.74	24 2 16.2	.4362259	31.73	.96060	2.32
9	53 8.97	23 47 1.5	.4328452	31.97	.96146	2.33
10	50 52.65	31 23.2	.4298840	32.19	.96232	2.34
11	48 30.66	23 15 23.8	.4273616	32.38	.96320	2.35
12	46 3.94	22 59 5.9	.4252948	32.53	.96408	2.36
13	43 33.52	42 32.7	.4236976	32.65	.96495	2.36
14	41 0.47	25 47.6	.4225813	32.74	.96583	2.36
15	38 25.86	22 8 54.6	.4219542	32.79	.96671	2.36
16	17 35 50.78	−21 51 58.0	9.4218215	32.80	9.96757	2.36

Ephemeris of Venus for the first series—Continued.

Washington Mean Noon.

Date.	α.	δ.	log Δ.	r.	log cos δ.	$\frac{1}{15}r$ sec δ.
1850.	h. m. s.	° ′ ″		″		s
Dec. 17	17 33 16.33	−21 35 2.5	9.4221848	32.77	9.96843	2.35
18	30 43.72	18 12.8	.4230420	32.70	.96926	2.34
19	28 13.91	21 1 33.5	.4243878	32.60	.97007	2.33
20	25 47.95	20 45 9.3	.4262131	32.47	.97086	2.31
21	23 26.80	29 5.1	.4285052	32.30	.97163	2.30
22	21 11.38	20 13 25.5	.4312487	32.09	.97236	2.28
23	19 2.53	19 58 14.9	.4344261	31.86	.97307	2.26
24	17 0.96	43 37.2	.4380176	31.60	.97374	2.24
25	15 7.36	29 36.1	.4420012	31.31	.97437	2.21
26	13 22.29	16 14.8	.4463532	30.99	.97496	2.19
27	11 46.24	19 3 36.2	.4510497	30.66	.97552	2.16
28	10 19.59	18 51 42.5	.4560665	30.31	.97603	2.14
29	9 2.62	40 35.6	.4613789	29.94	.97651	2.11
30	7 55.57	30 17.0	.4669623	29.56	.97695	2.08
31	6 58.60	20 47.6	.4727919	29.16	.97735	2.05
1851.						
Jan. 1	6 11.82	12 7.8	.4788439	28.76	.97771	2.02
2	5 35.25	18 4 17.9	.4850958	28.35	.97803	1.99
3	5 8.88	17 57 17.6	.4915256	27.93	.97832	1.96
4	4 52.65	51 6.3	.4981120	27.51	.97857	1.93
5	4 46.50	45 43.0	.5048354	27.09	.97879	1.90
6	4 50.25	41 6.6	.5116777	26.67	.97898	1.87
7	5 3.74	37 15.9	.5186219	26.24	.97913	1.84
8	5 26.83	34 9.2	.5256514	25.82	.97922	1.81
9	5 59.33	31 44.8	.5327505	25.40	.97935	1.78
10	6 41.01	30 0.9	.5399058	24.99	.97942	1.75
11	7 31.65	28 55.6	.5471047	24.58	.97946	1.72
12	8 31.05	28 26.8	.5543351	24.17	.97948	1.69
13	9 38.98	28 32.3	.5615859	23.77	.97948	1.66
14	10 55.21	29 10.0	.5688470	23.38	.97945	1.63
15	12 19.52	30 17.7	.5761091	22.99	.97941	1.61
16	13 51.67	31 53.4	.5833637	22.61	.97934	1.58
17	15 31.40	33 54.7	.5906030	22.24	.97926	1.56
18	17 18.48	36 19.3	.5978201	21.87	.97917	1.53
19	19 12.69	39 5.2	.6050086	21.51	.97906	1.51
20	21 13.81	42 10.1	.6121629	21.16	.97893	1.48
21	23 21.59	45 31.8	.6192780	20.81	.97880	1.46
22	25 35.80	49 8.2	.6263493	20.48	.97865	1.43
23	27 56.23	52 57.2	.6333728	20.15	.97849	1.41
24	30 22.64	17 56 56.8	.6403450	19.83	.97833	1.39
25	32 54.83	18 1 5.1	.6472630	19.52	.97817	1.37
26	35 32.58	5 20.0	.6541241	19.21	.97799	1.35
27	38 15.70	9 39.7	.6609259	18.91	.97781	1.33
28	41 3.98	14 2.3	.6676668	18.62	.97763	1.31
29	43 57.22	18 26.0	.6743453	18.34	.97744	1.29
30	46 55.24	22 49.1	.6809601	18.06	.97726	1.27
31	49 57.87	27 10.1	.6875104	17.79	.97707	1.25
Feb. 1	53 4.92	31 27.3	.6939956	17.52	.97689	1.23
2	56 16.23	35 39.1	.7004154	17.27	.97671	1.21
3	17 59 31.64	39 44.1	.7067697	17.02	.97654	1.20
4	18 2 50.99	43 40.9	.7130582	16.77	.97637	1.18
5	6 14.13	47 28.1	.7192811	16.53	.97621	1.16
6	9 40.93	51 4.4	.7254387	16.30	.97606	1.15
7	13 11.25	54 28.5	.7315313	16.07	.97591	1.13
8	16 44.96	18 57 39.1	.7375591	15.85	.97577	1.12
9	20 21.93	19 0 35.2	.7435225	15.64	.97565	1.10
10	24 2.03	3 15.7	.7494219	15.43	.97553	1.09
11	27 45.16	5 39.4	.7552579	15.22	.97542	1.07
12	31 31.20	7 45.3	.7610308	15.02	.97533	1.06
13	18 35 20.04	−19 9 32.5	9.7667411	14.82	9.97525	1.05

Ephemeris of Venus for the second series, or inferior conjunction of 1852.

Washington Mean Noon.

Date.	a.	δ.	log Δ.	r.	log cos δ.	$\frac{1}{15} r \sec \delta$.
1852.	h. m. s.	° ′ ″		″		s.
May 26	7 28 35.95	+24 50 45.1	9.7753112	14.53	9.95781	1.07
27	32 8.02	40 39.3	.7694729	14.73	.95841	1.08
28	35 36.06	30 11.6	.7635691	14.93	.95901	1.09
29	38 59.96	19 23.0	.7575999	15.14	.95963	1.11
30	42 19.58	24 8 14.5	.7515657	15.35	.96027	1.12
31	45 34.77	23 56 47.1	.7454669	15.57	.96091	1.14
June 1	48 45.40	45 1.9	.7393039	15.79	.96157	1.15
2	51 51.35	32 59.7	.7330773	16.01	.96223	1.16
3	54 52.48	20 41.5	.7267881	16.25	.96291	1.18
4	7 57 48.64	23 8 8.5	.7204371	16.49	.96359	1.20
5	8 0 39.69	22 55 21.8	.7140253	16.73	.96427	1.21
6	3 25.47	42 22.3	.7075540	16.98	.96496	1.23
7	6 5.84	29 11.2	.7010242	17.24	.96566	1.24
8	8 40.64	15 49.6	.6944378	17.51	.96635	1.26
9	11 9.72	22 2 18.6	.6877963	17.78	.96704	1.28
10	13 32.90	21 48 39.4	.6811017	18.05	.96774	1.30
11	15 50.01	34 53.2	.6743564	18.33	.96844	1.31
12	18 0.88	21 1.1	.6675627	18.62	.96912	1.33
13	20 5.32	21 7 4.2	.6607234	18.92	.96981	1.35
14	22 3.14	20 53 3.8	.6538418	19.22	.97049	1.37
15	23 54.15	39 1.2	.6469214	19.53	.97116	1.39
16	25 38.14	24 57.6	.6399662	19.85	.97182	1.41
17	27 14.89	20 10 54.3	.6329807	20.17	.97248	1.43
18	28 44.19	19 56 52.6	.6259704	20.50	.97313	1.45
19	30 5.83	42 53.7	.6189411	20.83	.97377	1.47
20	31 19.58	28 59.0	.6118993	21.17	.97439	1.50
21	32 25.21	15 9.9	.6048524	21.52	.97501	1.52
22	33 22.50	19 1 27.6	.5978088	21.87	.97561	1.54
23	34 11.22	18 47 53.5	.5907778	22.23	.97619	1.57
24	34 51.16	34 29.0	.5837692	22.59	.97677	1.59
25	35 22.13	21 15.5	.5767938	22.95	.97733	1.61
26	35 43.93	18 8 14.2	.5698634	23.32	.97787	1.64
27	35 56.38	17 55 26.5	.5629913	23.69	.97839	1.66
28	35 59.32	42 53.8	.5561920	24.07	.97890	1.68
29	35 52.63	30 37.3	.5494807	24.44	.97940	1.71
30	35 36.19	18 38.3	.5428732	24.82	.97987	1.73
July 1	35 9.92	17 6 57.9	.5363863	25.19	.98032	1.76
2	34 33.77	16 55 37.4	.5300382	25.56	.98076	1.78
3	33 47.75	44 38.0	.5238480	25.93	.98118	1.81
4	32 51.92	34 0.7	.5178354	26.29	.98159	1.83
5	31 46.36	23 46.4	.5120209	26.65	.98197	1.85
6	30 31.22	13 56.0	.5064250	26.99	.98233	1.87
7	29 6.71	16 4 30.6	.5010687	27.33	.98268	1.90
8	27 33.09	15 55 30.9	.4959735	27.65	.98300	1.92
9	25 50.69	46 57.7	.4911613	27.96	.98331	1.94
10	23 59.91	38 51.5	.4866534	28.25	.98360	1.96
11	22 1.19	31 13.0	.4824704	28.52	.98387	1.97
12	19 55.05	24 2.7	.4786323	28.77	.98411	1.99
13	17 42.08	17 20.9	.4751580	29.00	.98435	2.00
14	15 22.95	11 7.9	.4720657	29.21	.98456	2.02
15	12 58.39	5 23.8	.4693721	29.39	.98476	2.03
16	10 29.18	15 0 9.0	.4670919	29.55	.98494	2.04
17	7 56.12	14 55 23.5	.4652377	29.68	.98510	2.05
18	5 20.09	51 7.2	.4638199	29.77	.98525	2.05
19	2 42.02	47 19.9	.4628470	29.84	.98537	2.06
20	8 0 2.86	44 1.4	.4623245	29.88	.98548	2.06
21	7 57 23.54	41 11.4	.4622553	29.88	.98557	2.06
22	54 45.03	38 49.5	.4626392	29.85	.98566	2.06
23	52 8.29	36 55.2	.4634732	29.80	.98571	2.05
24	49 34.28	35 28.0	.4647517	29.71	.98576	2.05
25	7 47 3.90	+14 34 27.1	9.4664665	29.59	9.98580	2.04

Ephemeris of Venus for the second series—Continued.

Washington Mean Noon.

Date.	α.	δ.	log Δ.	r.	log cos δ.	$\frac{1}{15}r$ sec δ.
1852.	h. m. s.	° ′ ″		″		s.
July 26	7 44 38.03	+14 33 51.8	9.4686071	29.45	9.98581	2.03
27	42 17.51	33 41.3	.4711603	29.27	.98582	2.02
28	40 3.13	33 54.7	.4741106	29.07	.98581	2.00
29	37 55.60	34 30.9	.4774406	28.85	.98579	1.99
30	35 55.58	35 28.7	.4811314	28.61	.98576	1.97
31	34 3.64	36 47.1	.4851627	28.35	.98572	1.95
Aug. 1	32 20.26	38 24.8	.4895135	28.06	.98567	1.93
2	30 45.89	40 20.5	.4941620	27.76	.98560	1.91
3	29 20.88	42 33.0	.4990861	27.45	.98553	1.89
4	28 5.50	45 0.7	.5042636	27.13	.98545	1.87
5	26 59.96	47 42.2	.5096723	26.79	.98536	1.85
6	26 4.40	50 36.2	.5152906	26.45	.98526	1.82
7	25 18.90	53 41.1	.5210975	26.10	.98516	1.80
8	24 43.50	14 56 55.4	.5270726	25.74	.98505	1.78
9	24 18.18	15 0 17.7	.5331963	25.38	.98493	1.75
10	24 2.85	3 46.3	.5394504	25.01	.98482	1.73
11	23 57.40	7 19.8	.5458175	24.65	.98470	1.70
12	24 1.69	10 56.8	.5522813	24.29	.98457	1.68
13	24 15.58	14 35.9	.5588265	23.92	.98445	1.65
14	24 38.88	18 15.5	.5654393	23.56	.98432	1.63
15	25 11.38	21 54.2	.5721067	23.20	.98419	1.60
16	25 52.85	25 30.5	.5788168	22.85	.98407	1.58
17	26 43.06	29 3.2	.5855585	22.50	.98395	1.56
18	27 41.78	32 30.9	.5923220	22.15	.98382	1.53
19	28 48.78	35 52.3	.5990984	21.80	.98370	1.51
20	30 3.81	39 6.2	.6058795	21.47	.98359	1.49
21	31 26.62	42 11.2	.6126579	21.13	.98348	1.46
22	32 56.97	45 6.2	.6194266	20.81	.98338	1.44
23	34 34.64	47 50.1	.6261794	20.49	.98328	1.42
24	36 19.39	50 21.5	.6329106	20.17	.98319	1.40
25	38 10.98	52 39.4	.6396153	19.86	.98310	1.38
26	40 9.17	54 42.8	.6462889	19.56	.98303	1.36
27	42 13.74	56 30.6	.6529272	19.26	.98297	1.34
28	44 24.47	58 1.7	.6595264	18.97	.98291	1.32
29	46 41.14	15 59 15.2	.6660828	18.69	.98287	1.30
30	49 3.55	16 0 10.2	.6725935	18.41	.98284	1.28
31	51 31.47	0 45.7	.6790557	18.14	.98282	1.26
Sept. 1	54 4.70	1 0.9	.6854669	17.87	.98281	1.24
2	56 43.03	0 55.0	.6918250	17.61	.98281	1.22
3	7 59 26.26	16 0 27.3	.6981281	17.36	.98283	1.20
4	8 2 14.19	15 59 37.0	.7043746	17.11	.98285	1.19
5	5 6.62	58 23.4	.7105631	16.87	.98291	1.17
6	8 3.36	56 45.9	.7166925	16.63	.98296	1.15
7	11 4.23	54 43.9	.7227618	16.40	.98303	1.14
8	14 9.05	52 16.9	.7287702	16.18	.98312	1.12
9	17 17.65	49 24.5	.7347174	15.96	.98322	1.11
10	20 29.84	46 6.1	.7406030	15.74	.98334	1.09
11	23 45.47	42 21.4	.7464268	15.53	.98348	1.08
12	27 4.38	38 9.9	.7521888	15.33	.98362	1.06
13	30 26.41	33 31.3	.7578892	15.13	.98379	1.05
14	33 51.42	28 25.4	.7635283	14.93	.98397	1.03
15	37 19.26	22 52.0	.7691064	14.74	.98416	1.02
16	40 49.80	16 50.7	.7746240	14.56	.98437	1.01
17	8 44 22.91	+15 10 21.5	9.7800817	14.37	9.98459	0.99

The defect of illumination in right-ascension and declination may be readily obtained upon the admissible assumptions that the planet is spherical and illuminated by parallel solar rays. We are to compute the corrections to the measurements by a micrometer, the threads of which represent hour and declination-circles, and are tangent to the defective limbs at the points h and d, respectively. The illuminated portion of the planet is separated from the other half by a plane perpendicular to the line from the sun to the planet, and its visible boundary will be projected upon the plane of the apparent disc as a semi-ellipse. The plane is horned or gibbous, according as the planetocentric angle between earth and sun is more or less than 90°; and the unilluminated portion of the solar disc is, in each case, upon that side of the planet from which the sun is more than 180° distant—this geocentric angular distance being counted from the centre of the planet toward either side.

Employing r, as heretofore, for the apparent semidiameter of the planet, and denoting the semiaxes of the ellipse by a and b, we have $r = a$. And representing, in the plane triangle Sun-Earth-Planet, the two first angles by the initial letters of the respective bodies, we may assume, without appreciable error,

$$b = r \cos (S + E)$$

an expression which gives to the minor semiaxis a negative sign when the visible ellipse is unilluminated—*i. e.*, the planet horned.

Denoting now the geocentric longitude, right-ascension, and declination of the sun, by L, A, D,
the geocentric right-ascension and declination of the planet by α, δ
the heliocentric longitude and latitude " " λ, β
all of which quantities may be directly taken from the ephemerides—we have the equations

$$\begin{aligned}
\cos S &= -\cos \beta \cos (\lambda - L) \\
\cos E &= \sin \delta \sin D + \cos \delta \cos D \cos (\alpha - A) \\
\sin E \cos p &= -\cos \delta \sin D + \sin \delta \cos D \cos (\alpha - A) \\
\sin E \sin p &= -\cos D \sin (\alpha - A)
\end{aligned}$$

It is evident that the angle p is equal to the angle made with the semiaxis a by the tangent at d, or to the complement of that made by the tangent at h. The first equation may also be written

$$S = 180° + L - \lambda + 2 \sin^2 \tfrac{1}{2} \beta \operatorname{cotg} (L - \lambda)$$

and of the three angles S, E, p, the first two determine the magnitude of the ellipse, and never exceed 180°, while the last, counted like other angles of position from north through east round to the semiaxis b, fixes its position.

A convenient mode of computing the angles E and p is afforded by the employment of auxiliary quantities g and G; so that

$$\begin{aligned}
g \sin G &= \cos D \cos (\alpha - A) \\
g \cos G &= \sin D \\
\tan p &= \frac{\cos D \sin (\alpha - A)}{g \cos (G + \delta)} \\
\operatorname{cotg} E &= \tan (G + \delta) \cos p.
\end{aligned}$$

The general expression for the tangent of the angle included between a tangent to the ellipse and its major axis is

$$D_x y = \frac{b^2 x}{a^2 y}$$

and the distance between the centre of the ellipse and the point where this tangent intersects the major axis is $\frac{a^2}{x}$. Hence we have

$$\text{at the point } h \ldots\ldots\ldots\ldots \operatorname{cotg} p = \frac{b^2}{a^2} \cdot \frac{x'}{y'}$$

$$\text{at the point } d \ldots\ldots\ldots\ldots \tan p = \frac{b^2}{a^2} \cdot \frac{x''}{y''}$$

and transforming to oblique coordinates x_1 and y_1 parallel to the hour and declination circles,

$$x_1 = \frac{a^2}{x'} \cdot \cos p\,;\ y_1 = \frac{a^2}{x''} \cdot \sin p.$$

or eliminating x' and x'' by the equation of the ellipse $a^2\, b^2 = b^2\, x^2 + a^2\, y^2$

$$x_1^2 = a^2 \cos^2 p + b^2 \sin^2 p.$$
$$y_1^2 = a^2 \sin^2 p + b^2 \cos^2 p.$$

in which the substitution of the values $a = r,\ \ b = \cos\,(S + E)$ give

$$x_1 = r\sqrt{1 - \sin^2 p \sin^2\,(S + E)}$$
$$y_1 = r\sqrt{1 - \cos^2 p \sin^2\,(S + E)}$$

which, being subtracted from the semidiameter, give the defect of illumination

$$\varDelta\alpha \cos\delta = r - x_1 = r\,(1 - \sqrt{1 - \sin^2 p \sin^2\,(S + E)}),$$
$$\varDelta\delta = r - y_1 = r\,(1 - \sqrt{1 - \cos^2 p \sin^2\,(S + E)}),$$

For the preliminary correction in parallax we have, as usual,

$$\alpha' - \alpha = -\frac{\varpi_0}{\Delta} \cdot \frac{\rho \cos\varphi'}{\cos\delta}.\ \sin(\theta - \alpha)$$

$$\delta' - \delta = -\frac{\varpi_0}{\Delta} \cdot \rho \sin\varphi'.\ \frac{\sin(\delta - \zeta)}{\sin\zeta}$$

in which α' and δ' denote the geocentric places, and ζ is the auxiliary angle

$$\tan\zeta = \tan\varphi' \sec\,(\theta - \alpha)$$

The second equation may be written,

$$\delta' - \delta = -\frac{\varpi_0}{\Delta}\ \rho \sin\varphi'\,(\sin\delta \operatorname{cotg}\zeta - \cos\delta) = -\frac{\varpi_0}{\Delta} \left\{ \rho \cos\varphi' \sin\delta \cos\,(\theta - \alpha) - \rho \sin\varphi' \cos\delta \right\}$$

$$= \frac{\varkappa \cos\delta}{\Delta} - \frac{\varkappa' \sin\delta}{\Delta} \cos\,(\theta - \alpha)$$

It is very convenient to make use of auxiliary tables for these values, at least in the case of series so extended as the Santiago observations; we, therefore, write

$$\alpha - \alpha' = A \sin\,(\theta - \alpha)$$
$$\delta - \delta' = D + E \cos\,(\theta - \alpha)$$

and construct tables of $A = \dfrac{\varkappa'}{\Delta \cos\delta}$; $D = -\dfrac{\varkappa \cos\delta}{\Delta}$; $E = \dfrac{\varkappa' \sin\delta}{\Delta}$, and for meridian observations

$$D + E = -\frac{\varpi_0\, \rho}{\Delta} \sin\,(\varphi' - \delta)$$

Parallax-tables for Santiago.

Mars I.

Washington Noon.	log. *A*.		*D*.		log. *E*.		*D*+*E*.	
			″				″	
1849.—Dec. 7	1.13625	78	+7.236	8	0.73328	128	+12.65	2
8	1.13703	62	7.244	5	0.73456	109	12.67	2
9	1.13765	46	7.249	3	0.73565	90	12.69	1
10	1.13811	29	7.252	0	0.73655	71	12.70	1
11	1.13840	12	7.252	2	0.73726	52	12.71	1
12	1.13852	4	7.250	5	0.73778	32	12.72	0
13	1.13848	21	7.245	7	0.73810	13	12.72	1
14	1.13827	37	7.238	9	0.73823	7	12.71	1
15	1.13790	55	7.229	12	0.73816	27	12.70	1
16	1.13735	71	7.217	14	0.73789	47	12.69	2
17	1.13664	88	7.203	17	0.73742	67	12.67	3
18	1.13576	104	7.186	19	0.73675	86	12.64	3
19	1.13472	120	7.167	22	0.73589	106	12.61	3
20	1.13352	137	7.145	24	0.73483	125	12.58	4
21	1.13215	153	7.121	26	0.73358	143	12.54	5
22	1.13062	168	7.095	28	0.73215	162	12.49	5
23	1.12894	184	7.067	31	0.73053	180	12.44	5
24	1.12710	198	7.036	32	0.72873	197	12.39	6
25	1.12512	213	7.004	34	0.72676	215	12.33	6
26	1.12299	228	6.970	36	0.72461	231	12.27	6
27	1.12071	242	6.934	38	0.72230	247	12.21	7
28	1.11829	255	6.896	39	0.71983	263	12.14	7
29	1.11574	268	6.857	41	0.71720	277	12.07	7
30	1.11306	280	6.816	43	0.71443	292	12.00	8
31	1.11026	292	6.773	44	0.71151	305	11.92	8
1850.—Jan. 1	1.10734	304	6.729	45	0.70846	318	11.84	8
2	1.10430	315	6.684	47	0.70528	331	11.76	9
3	1.10115	325	6.637	48	0.70197	342	11.67	9
4	1.09790	335	6.589	49	0.69855	353	11.58	9
5	1.09455	345	6.540	50	0.69502	364	11.49	9
6	1.09110	354	6.490	51	0.69138	373	11.40	9
7	1.08756	363	6.439	51	0.68765	383	11.31	9
8	1.08393	371	6.388	52	0.68382	391	11.22	10
9	1.08022	378	6.336	53	0.67991	399	11.12	10
10	1.07644	386	6.283	54	0.67592	407	11.02	9
11	1.07258	392	6.229	54	0.67185	413	10.93	10
12	1.06866	398	6.175	55	0.66772	419	10.83	10
13	1.06468	404	6.120	55	0.66353	425	10.73	10
14	1.06064	410	6.065	55	0.65928	429	10.63	10
15	1.05654	414	6.010	55	0.65499	434	10.53	10
16	1.05240	419	5.955	55	0.65065	437	10.43	10
17	1.04821	422	5.900	56	0.64628	441	10.33	10
18	1.04399	425	5.844	56	0.64187	444	10.23	10
19	1.03974	429	5.788	55	0.63743	446	10.13	10
20	1.03545	431	5.733	55	0.63297	448	10.03	10
21	1.03114	434	5.678	55	0.62849	449	9.93	10
22	1.02680	436	5.623	55	0.62400	451	9.83	10
23	1.02244	437	5.568	55	0.61949	451	9.73	10
24	1.01807	439	5.513	54	0.61498	452	9.63	9
25	1.01368	440	5.459	54	0.61046	452	9.54	10
26	1.00928	441	5.405	54	0.60594	452	9.44	9
27	1.00487	441	5.351	53	0.60142	452	9.35	10
28	1.00046	441	5.298	53	0.59690	451	9.25	9
29	0.99605	442	5.245	52	0.59239	451	9.16	10
30	0.99163	442	5.193	52	0.58788	450	9.06	9
31	0.98721	442	5.141	52	0.58338	449	8.97	9
Feb. 1	0.98279	441	5.089	51	0.57889	448	8.88	9
2	0.97838	441	5.038	51	0.57441	446	8.79	9
3	0.97397	440	4.987	50	0.56995	445	8.70	9
4	0.96957	440	4.937	49	0.56550	443	8.61	8
5	0.96517		+4.888		0.56107		8.53	

Parallax tables for Santiago.

Mars II.

Washington Noon.		log. *A*.	Diff.	*D*.	Diff.	log. *E*.	Diff.	*D+E*.	Diff.
				″				″	
1851.	Dec. 12	0.96809	362	+5.412	43	0.46712	423	+8.34	8
	13	0.97171	362	5.455	43	0.47135	429	8.42	7
	14	0.97533	362	5.498	43	0.47564	436	8.49	7
	15	0 97895	360	5.541	43	0.48000	441	8.56	8
	16	0.98255	358	5.584	43	0.48441	447	8.64	7
	17	0.98613	357	5.627	42	0.48888	452	8.71	7
	18	0.98970	355	5.669	43	0.49340	457	8.78	8
	19	0.99325	352	5.712	42	0.49797	462	8.86	8
	20	0.99677	350	5.754	42	0.50259	466	8.94	7
	21	1.00027	346	5.796	41	0.50725	469	9.01	8
	22	1.00373	343	5.837	41	0.51194	472	9.09	7
	23	1.00716	339	5.878	41	0.51666	474	9.16	8
	24	1.01055	335	5.919	40	0.52140	476	9.24	8
	25	1.01390	330	5.959	39	0.52616	477	9.32	7
	26	1.01720	325	5.998	38	0.53093	477	9.39	8
	27	1.02045	319	6.036	37	0.53570	476	9.47	7
	28	1.02364	313	6.073	36	0.54046	475	9.54	8
	29	1.02677	307	6.109	36	0.54521	473	9.62	7
	30	1.02984	300	6.145	35	0.54994	470	9.69	8
	31	1.03284	293	6.180	33	0.55464	467	9.77	7
1852.	Jan. 1	1.03577	285	6.213	32	0.55931	462	9.84	7
	2	1.03862	277	6.245	31	0.56393	457	9.91	7
	3	1.04139	268	6.276	29	0.56850	451	9.98	7
	4	1.04407	259	6.305	28	0 57301	444	10.05	6
	5	1.04666	250	6.333	26	0.57745	436	10.11	7
	6	1.04916	239	6.359	25	0.58181	427	10.18	6
	7	1.05155	229	6.384	24	0.58608	418	10.24	6
	8	1.05384	218	6.408	22	0.59026	407	10.30	6
	9	1.05602	206	6.430	20	0.59433	396	10 36	6
	10	1.05808	195	6.450	18	0.59829	383	10.42	5
	11	1.06003	182	6.468	16	0.60212	370	10.47	5
	12	1.06185	170	6.484	14	0.60582	357	10.52	5
	13	1.06355	157	6.498	12	0.60939	342	10.57	4
	14	1.06512	143	6.510	10	0.61281	326	10.61	4
	15	1.06655	129	6.520	8	0.61607	310	10.65	4
	16	1.06784	115	6.528	6	0.61917	292	10.69	3
	17	1.06899	101	6.534	4	0.62209	274	10.72	3
	18	1.07000	86	6.538	1	0.62483	257	10.75	3
	19	1.07086	71	6.539	0	0.62740	238	10.78	2
	20	1.07157	55	6.539	3	0.62978	218	10.80	2
	21	1.07212	40	6.536	5	0.63196	199	10.82	2
	22	1.07252	24	6.531	7	0.63395	178	10.84	1
	23	1.07276	8	6.524	9	0.63573	157	10.85	0
	24	1.07284	7	6.515	12	0.63730	137	10.85	1
	25	1.07277	23	6.503	14	0.63867	116	10.86	1
	26	1.07254	39	6.489	16	0.63983	94	10.85	0
	27	1.07215	55	6.473	17	0.64077	73	10.85	1
	28	1.07160	70	6.456	19	0.64150	52	10.84	2
	29	1.07090	86	6.437	21	0.64202	31	10.82	2
	30	1.07004	101	6.416	23	0.64233	9	10.80	2
	31	1.06903	116	6.393	25	0.64242	11	10.78	2
	Feb. 1	1.06787	130	6.368	26	0.64231	32	10.76	3
	2	1.06657	145	6.342	28	0.64199	52	10.73	4
	3	1.06512	159	6.314	30	0.64147	72	10.69	3
	4	1.06353	173	6.284	31	0.64075	92	10.66	4
	5	1.06180	186	6.253	33	0.63983	111	10.62	5
	6	1.05994	200	6.220	34	0.63872	130	10.57	5
	7	1.05794	213	6.186	35	0.63742	148	10.52	4
	8	1.05581	225	6.151	36	0.63594	166	10.48	6
	9	1.05356	237	6.115	38	0.63428	184	10.42	5
	10	1.05119	249	+6.077	38	0.63244	201	+10.37	6

Parallax tables for Santiago.

Mars II—Continued.

Washington Noon.	log. *A*.		*D*.		log. *E*.		*D*+*E*.	
			″				″	
1852. Feb. 11	1.04870	249	+6.039	38	0.63043	201	+10.31	6
12	1.04610	260	6.000	39	0.62826	217	10.25	6
13	1.04339	271	5.960	40	0.62592	234	10.19	6
14	1.04057	282	5.919	41	0.62343	249	10.12	7
15	1.03765	292	5.877	42	0.62079	264	10.05	7
16	1.03464	301	5.835	42	0.61800	279	9.98	7
17	1.03154	310	5.792	43	0.61508	292	9.91	7
18	1.02835	319	5.748	44	0.61203	305	9.84	7
19	1.02508	327	5.704	44	0.60885	318	9.77	7
20	1.02173	335	5.660	44	0.60555	330	9.69	8
21	1.01831	342	5.616	44	0.60214	341	9.62	7
22	1.01482	349	5.571	45	0.59862	352	9.54	8
23	1.01126	356	5.526	45	0.59499	363	9.46	8
24	1.00765	361	5.481	45	0.59127	372	9.38	8
25	1.00398	367	5.436	45	0.58745	382	9.30	8
26	1.00026	372	5.391	45	0.58355	390	9.22	8
27	0.99649	377	5.346	45	0.57956	399	9.14	8
28	0.99268	381	5.301	45	0.57549	407	9.06	8
29	0.98883	385	5.256	45	0.57135	414	8.98	8
Mar. 1	0.98495	388	5.211	45	0.56714	421	8.90	8
2	0.98103	392	5.167	44	0.56286	428	8.82	8
3	0.97708	395	5.123	44	0.55852	434	8.74	8
4	0.97310	398	5.079	44	0.55413	439	8.66	8
5	0.96910	400	5.035	44	0.54968	445	8.58	8
6	0.96508	402	4.992	43	0.54518	450	8.50	8
7	0.96104	404	4.949	43	0.54063	455	8.42	8
8	0.95698	406	4.906	43	0.53604	459	8.34	8
9	0.95291	407	4.864	42	0.53140	464	8.26	8
10	0.94883	408	4.822	42	0.52672	468	8.18	8
11	0.94474	409	4.780	42	0.52201	471	8.11	7
12	0.94064	410	4.739	41	0.51726	475	8.03	8
13	0.93654	410	4.698	41	0.51247	479	7.95	8
14	0.93243	411	4.658	40	0.50765	482	7.88	7
15	0.92832	411	4.618	40	0.50280	485	7.80	8
16	0.92421	411	4.579	39	0.49793	487	7.73	7
17	0.92010	411	4.540	39	0.49303	490	7.65	8
18	0.91599	411	4.501	39	0.48810	493	7.58	7
19	0.91189	410	4.463	38	0.48315	495	7.50	8
20	0.90779	410	4.425	38	0.47817	498	7.43	7
21	0.90370	409	+4.388	37	0.47318	499	+7.36	7

Parallax tables for Santiago.

Venus I.

Washington Noon.	log *A*.		*D*.		log. *E*.		*D*+*E*.	
			″				″	
1850. Oct. 16	1.12715	630	+7.107	81	n0.72213	851	+1.83	2
17	1.13345	634	7.188	83	n0.73064	841	1.81	2
18	1.13979	637	7.271	86	n0.73905	831	1.79	2
19	1.14616	640	7.357	89	n0.74736	821	1.77	2
20	1.15256	643	7.446	91	n0.75557	812	1.75	1
21	1.15899	647	7.537	94	n0.76369	803	1.74	2
22	1.16546	650	7.631	97	n0.77172	795	1.72	1
23	1.17196	652	7.728	100	n0.77967	786	1.71	1
24	1.17848	655	7.828	103	n0.78753	778	1.70	1
25	1.18503	659	7.931	106	n0.79531	771	1.69	1
26	1.19162	662	8.037	109	n0.80302	763	1.68	0
27	1.19824	664	8.146	112	n0.81065	755	1.68	0
28	1.20488	667	8.258	116	n0.81820	748	1.68	$\overline{0}$
29	1.21155	670	8.374	120	n0.82568	741	1.68	0
30	1.21825	673	8.494	123	n0.83309	735	1.68	1
31	1.22498	675	8.617	127	n0.84044	728	1.69	1
Nov. 1	1.23173	678	8.744	131	n0.84772	722	1.70	2
2	1.23851	681	8.875	134	n0.85494	715	1.72	1
3	1.24532	684	9.009	139	n0.86209	709	1.73	2
4	1.25216	686	9.148	143	n0.86918	702	1.75	2
5	1.25902	688	9.291	147	n0.87620	696	1.77	3
6	1.26590	691	9.438	151	n0.88316	690	1.80	3
7	1.27281	693	9.589	156	n0.89006	684	1.83	3
8	1.27974	694	9.745	160	n0.89690	677	1.86	3
9	1.28668	695	9.905	165	n0.90367	670	1.89	5
10	1.29363	697	10.070	169	n0.91037	663	1.94	4
11	1.30060	697	10.239	173	n0.91700	656	1.98	5
12	1.30757	698	10.412	178	n0.92356	647	2.03	5
13	1.31455	697	10.590	183	n0.93003	639	2.08	6
14	1.32152	696	10.773	187	n0.93642	629	2.14	6
15	1.32848	694	10.960	191	n0.94271	619	2.20	6
16	1.33542	692	11.151	196	n0.94890	608	2.26	7
17	1.34234	689	11.347	200	n0.95498	596	2.33	8
18	1.34923	684	11.547	203	n0.96094	583	2.41	8
19	1.35607	679	11.750	207	n0.96677	569	2.49	8
20	1.36286	673	11.957	210	n0.97246	553	2.57	9
21	1.36959	665	12.167	214	n0.97799	536	2.66	10
22	1.37624	655	12.381	216	n0.98335	517	2.76	10
23	1.38279	645	12.597	219	n0.98852	496	2.86	11
24	1.38924	633	12.816	220	n0.99348	474	2.97	11
25	1.39557	619	13.036	222	n0.99822	449	3.08	12
26	1.40176	604	13.258	222	n1.00271	423	3.20	12
27	1.40780	587	13.480	222	n1.00694	394	3.32	13
28	1.41367	567	13.702	221	n1.01088	363	3.45	13
29	1.41934	545	13.923	220	n1.01451	328	3.58	14
30	1.42479	522	14.143	217	n1.01779	292	3.72	15
Dec. 1	1.43001	496	14.360	213	n1.02071	252	3.87	15
2	1.43497	468	14.573	208	n1.02323	210	4.02	16
3	1.43965	438	14.781	203	n1.02533	166	4.18	16
4	1.44403	405	14.984	195	n1.02699	118	4.34	17
5	1.44808	369	15.179	187	n1.02817	68	4.51	17
6	1.45177	335	15.366	177	n1.02885	16	4.68	17
7	1.45512	294	15.543	166	n1.02901	$\overline{40}$	4.85	18
8	1.45806	253	15.709	154	n1.02861	96	5.03	18
9	1.46059	209	15.863	140	n1.02765	155	5.21	17
10	1.46268	163	16.003	126	n1.02610	215	5.38	18
11	1.46433	119	16.129	110	n1.02395	275	5.56	18
12	1.46552	71	16.239	93	n1.02120	336	5.74	17
13	1.46623	24	16.332	75	n1.01784	398	5.91	17
14	1.46647	$\overline{25}$	16.407	57	n1.01386	458	6.08	17
15	1.46622	73	16.464	38	n1.00928	516	6.25	16
16	1.46549	122	+16.502	18	n1.00412	573	+6.41	15

Parallax tables for Santiago.

Venus I—Continued.

Washington Noon.	log. *A*.		*D*.		log. *E*.		*D*+*E*.	
			"				"	
1850. Dec. 17	1.46427	122	+16.520	18	*n*0.99839	573	+6.56	15
18	1.46258	169	16.519	1	*n*0.99212	627	6.70	14
19	1.46042	216	16.499	20	*n*0.98534	678	6.83	13
20	1.45780	262	16.460	39	*n*0.97809	725	6.95	12
21	1.45475	305	16.402	58	*n*0.97040	769	7.06	11
22	1.45127	348	16.327	75	*n*0.96232	808	7.16	10
23	1.44739	388	16.234	93	*n*0.95390	842	7.24	8
24	1.44313	426	16.125	109	*n*0.94519	871	7.31	7
25	1.43852	461	16.001	124	*n*0.93624	895	7.37	6
26	1.43357	495	15.863	138	*n*0.92709	915	7.41	4
27	1.42832	525	15.712	151	*n*0.91780	929	7.44	3
28	1.42279	553	15.550	162	*n*0.90841	939	7.45	1
29	1.41700	579	15.378	172	*n*0.89896	945	7.45	0
30	1.41098	602	15.197	181	*n*0.88951	945	7.44	1
31	1.40475	623	15.008	189	*n*0.88008	943	7.42	2
1851. Jan. 1	1.39834	641	14.813	195	*n*0.87071	937	7.39	3
2	1.39176	658	14.612	201	*n*0.86144	927	7.34	5
3	1.38504	672	14.407	205	*n*0.85229	915	7.29	5
4	1.37820	684	14.198	209	*n*0.84328	901	7.23	6
5	1.37126	694	13.987	211	*n*0.83444	884	7.16	7
6	1.36423	703	13.774	213	*n*0.82578	866	7.08	8
7	1.35713	710	13.561	213	*n*0.81731	847	7.00	8
8	1.34998	715	13.347	214	*n*0.80904	827	6.90	10
9	1.34279	719	13.134	213	*n*0.80098	806	6.81	9
10	1.33557	722	12.921	213	*n*0.79313	785	6.71	10
11	1.32832	724	12.710	211	*n*0.78549	764	6.61	10
12	1.32107	725	12.500	210	*n*0.77807	742	6.50	11
13	1.31383	724	12.293	207	*n*0.77086	721	6.39	11
14	1.30659	724	12.088	205	*n*0.76385	701	6.28	11
15	1.29937	722	11.886	202	*n*0.75704	681	6.17	11
16	1.29218	719	11.688	198	*n*0.75042	662	6.06	11
17	1.28502	716	11.493	195	*n*0.74399	643	5.95	11
18	1.27790	712	11.301	192	*n*0.73773	626	5.83	12
19	1.27082	708	11.113	188	*n*0.73164	609	5.72	11
20	1.26379	703	10.928	185	*n*0.72571	593	5.61	11
21	1.25681	698	10.747	181	*n*0.71992	579	5.50	11
22	1.24989	692	10.570	177	*n*0.71427	565	5.39	11
23	1.24302	687	10.397	173	*n*0.70874	553	5.28	11
24	1.23621	681	10.227	170	*n*0.70333	541	5.18	10
25	1.22946	675	10.062	165	*n*0.69802	531	5.07	11
26	1.22277	669	9.900	162	*n*0.69281	521	4.97	10
27	1.21615	662	9.742	158	*n*0.68768	513	4.87	10
28	1.20959	656	9.588	154	*n*0.68262	506	4.77	10
29	1.20310	649	9.438	150	*n*0.67762	500	4.68	9
30	1.19667	643	9.291	147	*n*0.67268	494	4.58	10
31	1.19030	637	9.148	143	*n*0.66778	490	4.50	8
Feb. 1	1.18400	630	9.009	139	*n*0.66291	487	4.41	9
2	1.17775	625	8.873	136	*n*0.65807	484	4.32	9
3	1.17157	618	8.741	132	*n*0.65325	482	4.24	8
4	1.16545	612	8.612	129	*n*0.64843	482	4.16	8
5	1.15939	606	8.486	126	*n*0.64362	481	4.08	8
6	1.15339	600	8.363	123	*n*0.63880	482	4.01	7
7	1.14744	595	8.244	119	*n*0.63396	484	3.94	7
8	1.14155	589	8.128	116	*n*0.62910	486	3.87	7
9	1.13572	583	8.015	113	*n*0.62422	488	3.81	6
10	1.12994	578	7.905	110	*n*0.61930	492	3.74	7
11	1.12421	573	7.797	108	*n*0.61434	496	3.68	6
12	1.11853	568	7.693	104	*n*0.60933	501	3.62	6
13	1.11289	564	+7.591	102	*n*0.60427	506	+3.57	5

Parallax tables for Santiago.

Venus II.

Washington Noon.	log. *A*.	Diff.	*D*.	Diff.	log. *E*.	Diff.	*D+E*.	Diff.
			″				″	
1852. May 26	1.12176	525	+ 7.150	106	0.70301	307	+12.20	14
27	1.12701	530	7.256	110	0.70608	302	12.34	14
28	1.13231	534	7.366	112	0.70910	296	12.48	15
29	1.13765	540	7.478	116	0.71206	290	12.63	15
30	1.14305	545	7.594	119	0.71496	286	12.78	16
31	1.14850	551	7.713	122	0.71782	280	12.94	15
June 1	1.15401	556	7.835	125	0.72062	275	13.09	16
2	1.15957	562	7.960	129	0.72337	271	13.25	16
3	1.16519	567	8.089	132	0.72608	266	13.41	17
4	1.17086	573	8.221	135	0.72874	261	13.58	16
5	1.17659	578	8.356	139	0.73135	257	13.74	17
6	1.18237	583	8.495	143	0.73392	253	13.91	18
7	1.18820	589	8.638	146	0.73645	249	14.09	18
8	1.19409	595	8.784	150	0.73894	245	14.27	18
9	1.20004	600	8.934	153	0.74139	241	14.45	18
10	1.20604	605	9.087	157	0.74380	237	14.63	19
11	1.21209	611	9.244	161	0.74617	234	14.82	19
12	1.21820	615	9.405	164	0.74851	230	15.01	19
13	1.22435	620	9.569	168	0.75081	227	15.20	20
14	1.23055	625	9.737	172	0.75308	224	15.40	20
15	1.23680	629	9.909	175	0.75532	221	15.60	21
16	1.24309	633	10.084	179	0.75753	219	15.81	20
17	1.24942	637	10.263	183	0.75972	216	16.01	21
18	1.25579	639	10.446	186	0.76188	213	16.22	22
19	1.26218	642	10.632	189	0.76401	211	16.44	22
20	1.26860	643	10.821	193	0.76612	208	16.66	22
21	1.27503	644	11.014	195	0.76820	205	16.88	22
22	1.28147	645	11.209	198	0.77025	203	17.10	22
23	1.28792	643	11.407	201	0.77228	200	17.32	24
24	1.29435	642	11.608	204	0.77428	197	17.56	23
25	1.30077	639	11.812	205	0.77625	194	17.79	23
26	1.30716	634	12.017	206	0.77819	191	18.02	23
27	1.31350	629	12.223	207	0.78010	187	18.25	23
28	1.31979	622	12.430	208	0.78197	183	18.48	24
29	1.32601	613	12.638	208	0.78380	178	18.72	23
30	1.33214	603	12.846	207	0.78558	172	18.95	23
July 1	1.33817	591	13.053	206	0.78730	167	19.18	23
2	1.34408	577	13.259	203	0.78897	160	19.41	23
3	1.34985	562	13.462	200	0.79057	153	19.64	22
4	1.35547	543	13.662	197	0.79210	144	19.86	22
5	1.36090	523	13.859	192	0.79354	135	20.08	21
6	1.36613	501	14.051	185	0.79489	125	20.29	20
7	1.37114	477	14.236	179	0.79614	113	20.49	19
8	1.37591	450	14.415	171	0.79727	101	20.68	19
9	1.38041	422	14.586	162	0.79828	87	20.87	17
10	1.38463	392	14.748	152	0.79915	72	21.04	17
11	1.38855	359	14.900	141	0.79987	56	21.21	15
12	1.39214	324	15.041	128	0.80043	39	21.36	13
13	1.39538	287	15.169	116	0.80082	21	21.49	12
14	1.39825	250	15.285	102	0.80103	2	21.61	10
15	1.40075	210	15.387	88	0.80105	$\overline{18}$	21.71	9
16	1.40285	170	15.475	72	0.80087	40	21.80	6
17	1.40455	127	15.547	56	0.80047	61	21.86	5
18	1.40582	85	15.603	39	0.79986	84	21.91	3
19	1.40667	41	15.642	23	0.79902	107	21.94	0
20	1.40708	$\overline{2}$	15.665	6	0.79795	130	21.94	$\overline{1}$
21	1.40706	46	15.671	$\overline{11}$	0.79665	152	21.93	3
22	1.40660	90	15.660	28	0.79513	175	21.90	5
23	1.40570	133	15.632	44	0.79338	198	21.85	7
24	1.40437	175	15.588	60	0.79140	221	21.78	10
25	1.40262	216	15.528	76	0.78919	243	21.68	11
26	1.40046	256	+15.452	90	0.78676	264	+21.57	13

Parallax tables for Santiago.

Venus II—Continued.

Washington Noon.	log. *A*.	Diff.	*D*.	Diff.	log. *E*.	Diff.	*D+E*.	Diff.
			″				″	
1852. July 27	1.39790	256	+15.362	90	0.78412	264	+21.44	13
28	1.39496	294	15.257	105	0.78128	284	21.30	14
29	1.39165	331	15.140	117	0.77824	304	21.14	16
30	1.38799	366	15.011	129	0.77502	322	20.97	17
31	1.38400	399	14.871	140	0.77162	340	20.78	19
Aug. 1	1.37970	430	14.721	150	0.76806	356	20.58	20
2	1.37512	458	14.562	159	0.76434	372	20.37	21
3	1.37027	485	14.395	167	0.76048	386	20.16	21
4	1.36517	510	14.222	173	0.75649	399	19.93	23
5	1.35985	532	14.043	179	0.75237	412	19.70	23
6	1.35433	552	13.860	183	0 74814	423	19.46	24
7	1.34863	570	13.672	188	0.74380	434	19.22	24
8	1.34276	587	13.482	190	0.73936	444	18.97	25
9	1.33675	601	13.290	192	0.73483	453	18.72	25
10	1.33062	613	13.096	194	0.73021	462	18.47	25
11	1.32438	624	12.902	194	0.72551	470	18.22	25
12	1.31804	634	12.708	194	0.72073	478	17.96	25
13	1.31162	642	12.514	194	0.71588	485	17.71	26
14	1.30513	649	12.321	193	0 71096	492	17.46	25
15	1.29859	654	12.130	191	0.70597	499	17.21	25
16	1.29200	659	11.941	189	0.70092	505	16.96	25
17	1.28538	662	11.754	187	0.69580	512	16.72	25
18	1.27874	664	11.569	185	0.69061	519	16.47	24
19	1.27208	666	11.386	183	0.68535	526	16.23	25
20	1.26541	667	11.207	179	0.68003	532	15.99	24
21	1.25874	667	11.031	176	0.67464	539	15.76	24
22	1.25208	666	10.858	173	0.66918	546	15.53	23
23	1.24543	665	10.688	170	0.66365	553	15.30	23
24	1.23879	664	10.521	167	0.65804	561	15.07	23
25	1.23217	662	10.358	163	0.65236	568	14.85	23
26	1.22557	660	10.198	160	0.64660	576	14.63	22
27	1.21900	657	10.042	156	0.64076	584	14.42	22
28	1.21245	655	9.889	153	0.63483	593	14.20	21
29	1.20594	651	9.740	149	0.62881	602	13.99	22
30	1.19946	648	9.594	145	0.62270	611	13.79	21
31	1.19302	644	9.452	142	0.61650	620	13.59	20
Sept. 1	1.18661	641	9.313	139	0.61020	630	13.39	20
2	1.18025	636	9.178	135	0.60380	640	13.19	20
3	1.17393	632	9.046	132	0.59730	650	13.00	20
4	1.16765	628	8.917	129	0.59068	662	12.81	19
5	1.16142	623	8.792	125	0.58395	673	12.63	19
6	1.15523	619	8.670	122	0.57710	685	12.45	18
7	1.14909	614	8.551	119	0.57013	697	12.27	18
8	1.14299	610	8.436	115	0.56303	710	12.09	18
9	1.13694	605	8.323	113	0.55581	722	11.92	18
10	1.13094	600	8.213	110	0.54845	736	11.75	17
11	1.12498	596	8.106	107	0.54095	750	11.58	17
12	1.11907	591	8.002	104	0.53330	765	11.42	17
13	1.11321	586	7.901	101	0.52550	780	11.26	16
14	1.10739	582	7.802	99	0.51754	796	11.10	16
15	1.10162	577	7.706	96	0.50942	812	10.94	16
16	1.09589	573	7.612	94	0.50112	830	10.78	16
17	1.09021	568	+ 7.521	91	0.49265	847	+10.63	15

For correcting the Santiago observations for differential refraction we have, using as before, α, δ, a, d, to denote the respective positions of the planet and its comparison-star; κ, the refraction from Bessel's third table, and ζ the zenith distance:

$$\cos\zeta = \sin n \sin (N + \delta)$$

and as a correction for the measured differences,

$$\delta(\alpha - \mathrm{a}) = \frac{\kappa\,(\delta - \mathrm{d})}{\sin^2 (N + \mathrm{d})} \cdot \frac{\cos (N + 2\mathrm{d})}{\cos^2 \mathrm{d}} \operatorname{cotg} n$$

$$\delta(\delta - \mathrm{d}) = \frac{\kappa\,(\delta - \mathrm{d})}{\sin^2 (N + \mathrm{d})}$$

in which the auxiliary quantities N cotg n sin n are taken from the following table, which has been computed for the latitude of Santiago, and for the hour-angle $\theta - \alpha$ as argument.

Table for computation of differential refraction at Santiago.

$\theta-\alpha$.	N.		log. cotg n.		log. sin n.		$\theta-\alpha$.	N.		log. cotg n.	
h. m.	° ′ ″						h. m.	° ′	′		
0 0	123 26 25	1	. . .		0.00000	0	1 0	124 21.6	1.9	9.34477	736
1	26 26	3	7.56122	30104	0.00000	1	1	23.5	1.9	9.35213	725
2	26 29	5	7.86226	17610	9.99999	2	2	25.4	2.0	9.35938	714
3	26 34	6	8.03836	12495	9.99997	2	3	27.4	2.0	9.36652	703
4	26 40	8	8.16331	9692	9.99995	3	4	29.4	2.0	9.37355	692
5	26 48	10	8.26023	7920	9.99992	2	5	31.4	2.0	9.38047	683
6	26 58	12	8.33943	6696	9.99990	4	6	33.4	2.1	9.38730	673
7	27 10	13	8.40639	5802	9.99986	4	7	35.5	2.2	9.39403	663
8	27 23	16	8.46441	5118	9.99982	5	8	37.7	2.1	9.40066	655
9	27 39	17	8.51559	4578	9.99977	6	9	39.8	2.2	9.40721	646
10	27 56	19	8.56137	4143	9.99971	6	10	42.0	2.2	9.41367	637
11	28 15	21	8.60280	3782	9.99965	6	11	44.2	2.3	9.42004	629
12	28 36	22	8.64062	3480	9.99959	8	12	46.5	2.3	9.42633	621
13	28 58	25	8.67542	3222	9.99951	7	13	48.8	2.3	9.43254	613
14	29 23	26	8.70764	3001	9.99944	9	14	51.1	2.4	9.43867	605
15	29 49	28	8.73765	2808	9.99935	9	15	53.5	2.4	9.44472	598
16	30 17	30	8.76573	2638	9.99926	9	16	55.9	2.5	9.45070	590
17	30 47	31	8.79211	2487	9.99917	10	17	124 58.4	2.5	9.45660	584
18	31 18	34	8.81698	2354	9.99907	11	18	125 0.9	2.5	9.46244	577
19	31 52	35	8.84052	2233	9.99896	11	19	3.4	2.5	9.46821	570
20	32 27	37	8.86285	2126	9.99885	12	20	5.9	2.6	9.47391	563
21	33 4	40	8.88411	2026	9.99873	12	21	8.5	2.6	9.47954	558
22	33 44	40	8.90437	1937	9.99861	13	22	11.1	2.7	9.48512	551
23	34 24	43	8.92374	1856	9.99848	14	23	13.8	2.7	9.49063	545
24	35 7	45	8.94230	1780	9.99834	14	24	16.5	2.7	9.49608	540
25	35 52	46	8.96010	1711	9.99820	15	25	19.2	2.8	9.50148	533
26	36 38	48	8.97721	1647	9.99805	15	26	22.0	2.8	9.50681	527
27	37 26	50	8.99368	1588	9.99790	16	27	24.8	2.8	9.51208	523
28	38 16	52	9.00956	1532	9.99774	16	28	27.6	2.9	9.51731	517
29	39 8	54	9.02488	1481	9.99758	17	29	30.5	2.9	9.52248	512
30	40 2	55	9.03969	1433	9.99741	18	30	33.4	3.0	9.52760	507
31	40 57	58	9.05402	1389	9.99723	18	31	36.4	3.0	9.53267	502
32	41 55	59	9.06791	1346	9.99705	19	32	39.4	3.0	9.53769	497
33	42 54	61	9.08137	1307	9.99686	19	33	42.4	3.1	9.54266	493
34	43 55	63	9.09444	1269	9.99667	20	34	45.5	3.1	9.54759	487
35	44 58	65	9.10713	1234	9.99647	20	35	48.6	3.2	9.55246	483
36	46 3	67	9.11947	1201	9.99627	21	36	51.8	3.2	9.55729	479
37	47 10	69	9.13148	1170	9.99606	22	37	55.0	3.2	9.56208	475
38	48 19	70	9.14318	1139	9.99584	22	38	125 58.2	3.3	9.56683	470
39	49 29	73	9.15457	1111	9.99562	23	39	126 1.5	3.3	9.57153	466
40	50 42	74	9.16568	1085	9.99539	23	40	4.8	3.3	9.57619	462
41	51 56	76	9.17653	1059	9.99516	24	41	8.1	3.4	9.58081	458
42	53 12	78	9.18712	1035	9.99492	25	42	11.5	3.4	9.58539	454
43	54 30	81	9.19747	1011	9.99467	25	43	14.9	3.5	9.58993	451
44	55 51	82	9.20758	989	9.99442	25	44	18.4	3.5	9.59444	447
45	57 13	83	9.21747	969	9.99417	26	45	21.9	3.6	9.59891	443
46	123 58 36	86	9.22716	948	9.99391	27	46	25.5	3.6	9.60334	439
47	124 0 2	88	9.23664	928	9.99364	28	47	29.1	3.6	9.60773	436
48	1 30	90	9.24592	910	9.99336	28	48	32.7	3.7	9.61209	433
49	3 0	91	9.25502	892	9.99308	28	49	36.4	3.7	9.61642	429
50	4 31	94	9.26394	876	9.99280	29	50	40.1	3.8	9.62071	426
51	6 5	95	9.27270	858	9.99251	30	51	43.9	3.8	9.62497	422
52	7 40	98	9.28128	843	9.99221	30	52	47.7	3.8	9.62919	419
53	9 18	99	9.28971	828	9.99191	31	53	51.5	3.9	9.63338	417
54	10 57	102	9.29799	813	9.99160	31	54	55.4	3.9	9.63755	414
55	12 39	103	9.30612	800	9.99129	32	55	126 59.3	4.0	9.64169	410
56	14 22	106	9.31412	785	9.99097	33	56	127 3.3	4.0	9.64579	407
57	16 8	107	9.32197	773	9.99064	33	57	7.3	4.1	9.64986	404
58	17 55	109	9.32970	760	9.99031	34	58	11.4	4.1	9.65390	402
59	19 44	112	9.33730	747	9.98997	34	59	15.5	4.1	9.65792	399
60	124 21 36		9.34477		9.98963		60	127 19.6		9.66191	

Table for computation of differential refractions at Santiago—Continued.

$\theta - \alpha$.	*N.*		log. cotg *n.*	
h. m.	° ′	′		
2 0	127 19.6	4.2	9.66191	396
1	23.8	4.3	9.66587	393
2	28.1	4.3	9.66980	391
3	32.4	4.3	9.67371	388
4	36.7	4.4	9.67759	386
5	41.1	4.4	9.68145	383
6	45.5	4.5	9.68528	380
7	50.0	4.5	9.68908	378
8	54.5	4.6	9.69286	376
9	127 59.1	4.6	9.69662	373
10	128 3.7	4.7	9.70035	371
11	8.4	4.7	9.70406	369
12	13.1	4.7	9.70775	367
13	17.8	4.8	9.71142	364
14	22.6	4.9	9.71506	363
15	27.5	4.9	9.71869	360
16	32.4	4.9	9.72229	358
17	37.3	5.0	9.72587	356
18	42.3	5.1	9.72943	354
19	47.4	5.1	9.73297	352
20	52.5	5.2	9.73649	350
21	128 57.7	5.2	9.73999	348
22	129 2.9	5.3	9.74347	346
23	8.2	5.3	9.74693	345
24	13.5	5.3	9.75038	342
25	18.8	5.4	9.75380	341
26	24.2	5.5	9.75721	339
27	29.7	5.5	9.76060	337
28	35.2	5.6	9.76397	336
29	40.8	5.6	9.76733	333
30	46.4	5.7	9.77066	332
31	52.1	5.8	9.77398	331
32	129 57.9	5.8	9.77729	329
33	130 3.7	5.8	9.78058	327
34	9.5	5.9	9.78385	325
35	15.4	6.0	9.78710	324
36	21.4	6.0	9.79034	322
37	27.4	6.1	9.79356	321
38	33.5	6.1	9.79677	319
39	39.6	6.2	9.79996	318
40	45.8	6.3	9.80314	316
41	52.1	6.3	9.80630	315
42	130 58.4	6.4	9.80945	314
43	131 4.8	6.4	9.81259	312
44	11.2	6.5	9.81571	311
45	17.7	6.5	9.81882	309
46	24.2	6.6	9.82191	308
47	30.8	6.7	9.82499	306
48	37.5	6.8	9.82805	305
49	44.3	6.8	9.83110	304
50	51.1	6.9	9.83414	302
51	131 58.0	6.9	9.83716	301
52	132 4.9	7.0	9.84017	300
53	11.9	7.0	9.84317	299
54	18.9	7.1	9.84616	298
55	26.0	7.2	9.84914	296
56	33.2	7.3	9.85210	295
57	40.5	7.3	9.85505	293
58	47.8	7.4	9.85798	292
59	55.2	7.4	9.86090	292
60	133 2.6		9.86382	

The Cambridge observations were given without any correction for refraction. The series is not sufficiently extensive to warrant the computation of tables for this purpose; but manuscript tables computed for the Cloverden observatory, which is only about half a mile distant from the Harvard observatory and differs but a few seconds in latitude, furnished values of the requisite auxiliary quantities. These tables are omitted here, on account of the disproportionate length to which it would be necessary to print them, inasmuch as of all the twenty-six Cambridge observations of *Mars*, (only seventeen of which were contemporaneous with the Santiago series,) there are but three when the hour-angle was less than 2^h, and but four others when the planet was within 3^h of the meridian The remainder were at very low altitudes, the meridian distances ranging from 3^h to $6^h\ 53^m$, and the differential refraction in declination amounting in one instance to $1''.45$. These values are, moreover, uncertain, to some extent, from the absence of the corresponding readings of any meteorological instrument, excepting the external thermometer.

At the Cape of Good Hope observatory, forty-seven determinations and forty-nine comparisons were made, the hour-angle exceeding 46^m in only five instances, and approaching the maximum $1^h\ 35^m$ in but a single isolated case. And since the latitude of this observatory differs from that of Santiago by less than half a degree, and the whole differential refraction for the observations of the Cape series exceeds $0''.75$ in only two instances, we may without sensible error employ, in reducing this series, the tables computed for Santiago, with slight modification in extreme cases. Thus, since

$$\cos n = \cos\varphi \sin(\theta - \alpha)$$
$$\sin n \cos N = \sin\varphi$$

and, consequently,

$$\cos^2 N = \frac{\sin^2\varphi}{1 - \cos^2\varphi \sin^2(\theta - \alpha)}$$
$$\operatorname{tg} N = \operatorname{cotg}\varphi \cos(\theta - \alpha)$$
$$\delta N = \frac{\cos(\theta - \alpha)}{1 - \cos^2\varphi \sin^2(\theta - \alpha)}\,\delta\varphi$$

we have even when $(\theta - \alpha) = 15°$

$$\delta N = 1.013\,\delta\varphi = 0°\ 30'\ 0''$$

The observations of Mr. Maclear having been thoroughly reduced under the personal supervision of that eminent astronomer, the labor was very considerably lightened, since the two computations served reciprocally as checks.

§ 5. COMPARISON STARS.

The determination of the comparison-stars,—by far the most laborious and time-consuming portion of the work, and one entirely foreign to the original plan of investigation,—became unexpectedly but imperatively necessary, in consequence of the circumstances already narrated, which entailed the necessity of a thorough examination of all the observations which could be found. In the quest of measured declinations of these stars, no accessible source has been left unexplored; still, the attempt to identify the objects employed for comparison has offered problems of much difficulty, and has, in some instances, proved altogether unavailing. For instance, out of the twenty-six comparisons at Cambridge eleven were with stars not merely different from those selected by Lieut. Gilliss and proposed in his ephemeris, but quite unknown even to the observer, and only capable of detection by groping, as it were, in zones and catalogues; and of these, two were of magnitudes as low as the 13th. Eight of them have not been found, although sought for with extreme diligence. In other cases, especially among the southern stars of the first *Venus*-series, the determinations on record have been found so discordant as to preclude any reliance upon them, until new observations should be made, to decide which were to be considered erroneous.

The declinations of the comparison stars, used for the Washington micrometer observations—as well as those of many other stars not easily identified in the standard catalogues, or whose positions appeared for any reason not altogether trustworthy—have been redetermined at the United States Naval Observatory, at Washington, with the mural circle; chiefly through the zeal and courtesy of Prof. Yarnall, whose careful assiduity has materially aided the present investigations, and on some nights by Prof. Major. At the earnest instance of the writer, application was made to the superintendent of the Naval Observatory, by Lieut. Gilliss, for observation of still other declinations. The season of the year naturally prevented the redetermination of all that could be desired, but many important additional positions have been thus provided by Prof. Yarnall, to whom the charge of the mural circle is assigned. The observations, as communicated by Lieutenants Maury and Brasher, are given in their appropriate place.

Application was also made to my respected friend Prof. Brünnow, of the observatory of the University of Michigan, at Ann Arbor, whose recently acquired and magnificent meridian circle had just been mounted. But the arrangements of the observatory not being completed, and the instrument not yet fully brought into working condition, Prof. Brünnow was able to make but few of the desired observations, and these were not received in sufficient season to be incorporated into the results. They are, however, given with the other determinations for the sake of comparison and reference.

The materials collected for the compilation of a definite catalogue of star-places, to be adopted as final in the present discussion, are here presented in detail.

In the first place, the observations of Lieut. Gilliss himself, at Santiago, provide a rich mine of positions of fixed stars, among which are many of those employed for comparison, and all of those used during the second opposition of *Mars*. During the first *Mars*-series the instrument was dismantled, as explained by Lieut. Gilliss in his narrative, and during the two series of *Venus* observations it was impossible to observe the comparison-stars upon the meridian in the full glare of day. The following tables present the several observations, their reduction to the mean equinox at the beginning of those years in which they were respectively used for comparison with the planets, and finally a list of mean positions at these epochs for the comparison-stars, as given by the Santiago meridian-circle. The reference-figures in the last column indicate the number of the star in the special list, or in the General Catalogue of comparison-stars, as the case may be.

Reduction to mean places of stars, determined with the meridian-circle at Santiago.

Name.	Date.	Obs'd α.	Circle-reading.	Refraction.	Nadir.	Observed δ.	Reduct'n to mean equinox 1852.0. in α.	Reduct'n to mean equinox 1852.0. in δ.	Mean place for 1852.0. α.	Mean place for 1852.0. δ.	No.
	1852.	h. m. s.	° ′ ″	′ ″	″	° ′ ″	s.	″	h. m. s.	° ′ ″	
Bessel 341	Feb. 28	7 48 38.68	301 40 46.68	−1 26.14	+5.2	+24 54 8.37	−0.46	+1.86	7 48 38.20	+24 54 10.23	52
	29	38.42	46.43	26.88	4.3	10.26	0.45	1.81	37.97	12.07	
	Mar. 1	38.58	42.78	25.19	3.8	12.72	0.43	1.75	38.15	14.47	
	2	38.92	43.70	24.17	5.2	9.38	0.42	1.68	38.50	11.06	
	3	39.14	45.05	25.25	4.8	9.51	0.41	1.61	38.73	11.12	
H. C. 15401	Mar. 6	7 46 36.90	301 50 4.42	−1 24.35	+5.0	+24 44 49.04	−0.37	+1.44	7 46 36.53	+24 44 50.48	47
	13	37.11	3.10	24.27	4.0	51.28	0.26	1.02	36.85	52.30	
	15	36.58	5.32	25.31	4.8	49.30	0.23	0.88	36.35	50.18	
H. C. 15412	Mar. 8	7 46 57.57	301 58 5.68	−1 25.51	+5.3	+24 36 48.64	−0.34	+1.37	7 46 57.23	+24 36 50.01	48
	9	57.51	6.75	23.57	4.1	46.83	0.32	1.31	57.19	48.14	
	10	57.63	5.82	24.70	5.2	47.79	0.31	1.25	57.32	49.04	
Bessel 339	Mar. 12	7 50 59.90	302 6 27.95	−1 23.84	+4.4	+24 28 25.60	−0.31	+1.19	7 50 59.59	+24 28 26.79	54
	13	59.85	27.39	23.39	4.0	26.11	0.30	1.13	59.55	27.24	
	23	59.72	26.60	24.33	5.1	26.74	0.13	0.53	59.59	27.27	
H. C. 15608	Mar. 14	7 52 38.80	302 15 55.02	−1 23.00	+3.5	+24 18 58.59	−0.27	+1.12	7 52 38.53	+24 18 59.71	55
	15	38.46	56.28	24.02	4.8	57.05	0.26	1.06	38.20	58.11	
	19	38.52	57.00	24.79	4.1	57.80	0.20	0.83	38.32	58.63	
	1851.										
Bessel 275	Dec. 19	9 7 25.42	306 43 26.18	−1 12.71	−7.8	+19 51 28.44	+0.36	+1.95	9 7 25.78	+19 51 30.39	103
	1852.										
	Apr. 2	26.14	8.02	11.88	+7.7	30.27	−0.37	1.63	25.77	31.90	
Washington	Mar. 16	9 8 15.15	306 19 9.88	−1 12.11	+6.2	+20 15 30.14	−0.60	+2.71	9 8 14.55	+20 15 32.85	107
	26	15.24	8.25	11.39	4.9	32.35	0.46	2.00	14.78	34.35	
	27	14.92	1.22	11.99	13.1	31.78	0.45	1.93	14.47	33.71	
	29	15.09	4.32	11.78	8.9	32.67	0.42	1.79	14.67	34.46	
Bessel 275	Mar. 30	9 8 14.82	306 42 26.05	−1 10.75	+8.8	+19 52 10.01	−0.41	+1.84	9 8 14.41	+19 52 11.85	106
	31	14.67	26.15	10.15	8.3	9.81	0.37	1.63	14.30	11.44	
Bessel 275	Mar. 10	9 4 27.46	305 57 8.14	−1 13.14	+5.2	+20 37 33.91	−0.61	+3.03	9 4 26.85	+20 37 36.94	102
	23	27.26	5.05	13.43	5.1	37.39	0.46	2.09	26.80	39.48	
	25	27.39	5.45	13.13	5.0	36.79	0.43	1.95	26.96	38.74	
Bessel 278	Mar. 15	8 47 26.28	304 19 33.50	−1 17.82	+4.8	+22 15 13.62	−0.51	+2.08	8 47 25.77	+22 15 15.70	91
	16	26.83	31.70	17.61	6.2	13.82	0.50	2.01	26.33	15.83	
	22	26.46	31.82	17.51	5.5	14.30	0.43	1.57	26.03	15.87	
	26	26.60	32.98	16.83	4.9	13.06	0.36	1.29	26.24	14.35	
Bessel 344	Mar. 13	8 40 18.16	303 50 7.68	−1 18.38	+3.9	+22 44 40.91	−0.50	+1.99	8 40 17.66	+22 44 42.90	87
	15	18.10	8.42	19.23	4.8	40.12	0.47	1.80	17.63	41.92	
B. A. C. 3181	Mar. 13	9 12 18.49	306 51 53.20	−1 10.28	+3.9	+19 42 47.29	−0.61	+3.06	9 12 17.88	+19 42 50.35	109
	15	18.07	53.55	11.01	4.8	46.77	0.60	2.94	17.47	49.71	
λ Cancri	Jan. 19	8 11 44.15	302 5 57.68	−1 24.47	+1.3	+24 28 59.60	−0.48	+4.01	8 11 43.67	+24 29 3.61	64
	20	44.57	58.88	24.17	−0.6	60.00	0.49	4.00	44.08	4.00	
	21	44.24	6 1.82	24.91	−0.4	57.60	0.51	3.99	43.73	1.59	
	22	44.45	5 57.08	24.87	+3.6	58.30	0.52	3.98	43.93	2.28	
	23	44.29	57.98	25.20	1.0	60.33	0.53	3.96	43.76	4.29	
	24	44.42	57.10	25.14	+2.0	60.15	0.54	3.93	43.88	4.08	
	25	44.38	58.12	24.52	−0.5	61.01	0.55	3.91	43.83	4.92	
	27	44.33	58.05	24.41	+0.1	60.37	0.56	3.86	43.77	4.23	
	28	44.37	6 1.32	24.68	3.5	56.97	0.57	3.83	43.80	0.80	
	30	44.38	0.45	25.17	+0.6	58.23	0.58	3.77	43.80	2.00	
	31	44.12	1.30	24.32	−1.2	58.33	0.58	3.74	43.54	2.07	
	Feb. 1	44.25	5 57.95	23.85	+2.5	57.51	0.59	3.70	43.66	1.21	
	2	44.00	57.65	23.80	+2.3	57.96	0.60	3.60	43.40	1.62	
	3	44.40	56.00	24.03	1.7	60.44	0.60	3.61	43.80	4.03	
	4	.....	57.63	24.58	1.1	59.96	0.61	3.56	.....	3.52	
	8	44.02	57.45	23.62	1.5	58.78	0.61	3.39	43.41	2.17	
	9	43.78	59.88	23.70	1.2	56.73	0.62	3.34	43.16	0.07	
	10	44.30	49.58	23.76	9.8	58.49	0.62	3.29	43.68	2.17	

Reduction of stars determined at Santiago—Continued.

Name.	Date.	Obs'd α.	Circle-reading	Refraction.	Nadir.	Observed δ.	Reduct'n to mean equinox 1852.0 in α.	Reduct'n to mean equinox 1852.0 in δ.	Mean place for 1852.0. α.	Mean place for 1852.0. δ.	No.
	1852.	h. m. s.	° ′ ″	′ ″	″	° ′ ″	s.	″	h. m. s.	° ′ ″	
λ Cancri	Feb. 11	8 11 44.38	302 5 51.08	—1 24.45	+7.9	+24 28 59.58	—0.61	+3.24	8 11 43.77	+24 29 2.82	64
(Cont'd.)	13	44.45	49.13	24.17	9.6	59.55	0.61	3.13	43.84	3.39	
	14	41.31	51.93	24.52	6.3	60.40	0.61	3.08	43 70	3.48	
	15	44.22	54 93	24.61	4.7	59.09	0 60	3.02	43.62	2.11	
	16	44.39	54.45	24.36	4.9	59.12	0.60	2.96	43.79	2.08	
	17	44.50	53.05	24.74	6 9	58.90	0 60	2.90	43.90	1.80	
	18	44.35	52.77	25.92	6.0	61.26	0.60	2.84	43.75	4 10	
	19	44.30	55.38	24.58	3 5	59.81	0.59	2.78	43.71	2.59	
	20	44.17	54.15	24.35	2.9	61.41	0.59	2.72	43.58	4.13	
	21	44.26	53.45	23.51	6.4	57.77	0.59	2.66	43.67	0.43	
	22	43 96	55.83	24.06	2.7	59.64	0.58	2.59	43.38	3.02	
	23	44.21	55.52	24.86	4.6	58.85	0.57	2.53	43.64	1.38	
	24	44.22	53.65	23.88	4.7	59.64	0.57	2 47	43.65	2 11	
	Mar. 13	44.09	50.20	23.55	3.9	63.56	0 39	1.26	43.70	4.82	
	15	43.78	50.75	24.59	4.8	63.15	0.36	1.12	43.42	4.27	
Washington	Mar. 19	8 28 3.38	303 0 37.92	—1 22.73	+ 4.1	+23 34 14.82	+0.37	+1.26	8 28 3.01	+23 34 17.83	78
	20	3.32	35.90	21.72	3.9	16.03	0.36	1.18	2.96	17.21	
	22	3.14	34.18	21.31	5.5	15.74	0.33	1.10	2.81	16.74	
Bessel 344	Jan. 24	8 28 15.34	302 49 19.65	—1 22.84	+ 2.0	+23 45 35.30	—0.53	+4.10	8 28 14.81	+23 45 39.40	79
	25	15.10	24.38	22.62	— 0.5	32.85	0.54	4.09	14.56	36.94	
	Mar. 13	15.02	15.52	21.18	+ 3.9	35.87	0.46	1.63	14.56	37.50	
Washington	Jan. 27	8 27 32.17	302 36 27.33	—1 22.92	+ 0.1	+23 58 7.11	—0.56	+4.04	8 27 31.61	+23 58 11.15	*77
	Mar. 15	31.73	47.28	22.97	4.8	5.00	0.43	1.42	31.30	6.42	
	16	32.35	46.22	22.75	6.2	4.44	0.43	1.35	31.92	5.79	
H. C. 16464	Jan. 28	8 16 36.37	302 33 25.30	—1 23.20	+ 3.5	+24 1 28.51	—0.57	+3.88	8 16 35.80	+24 1 32.39	69
	Mar. 31	35.85	13.02	18.50	8.3	31.29	0.13	0.26	35.72	31.55	
Washington	Mar. 23	8 20 55.47	302 20 17.42	—1 23.36	+ 5.1	+24 5 34.95	—0.28	+0.78	8 20 55.19	+24 5 35.73	73
	26	55.00	26.00	22.40	4.9	25.61	0.23	0.57	54.77	26.18	
Washington	Mar. 16	8 19 47.60	302 25 15.22	—1 23.32	+ 6.2	+24 9 36.01	—0.31	+1.21	8 19 47.29	+24 9 37.22	71
	22	47.17	11.38	23.08	5.5	40.31	0.28	0.80	46.89	41.11	
	25	47.56	11.82	23.15	5.0	40.44	0.24	+0.59	47.32	41.03	
	April 6	46.67	6.00	23.28	8.2	43.19	0.05	—0.26	46.62	42.93	
Washington	Mar. 27	8 19 50.05	302 15 1.05	—1 23.66	+13.1	+24 19 43.62	—0.21	+0.45	8 19 49.84	+24 19 44.07	72
	29	49.83	6.70	23.42	8.9	41.93	0.18	+0.32	49.65	42.25	
	April 8	49.75	5.90	23.37	8.0	43.58	0.01	—0.30	49.74	43.28	
Bessel 344	Feb. 1	8 16 9.13	302 9 56.52	—1 23.75	— 2.5	+24 25 3.84	—0.60	+3.74	8 16 8.53	+24 25 7.58	68
	2	8.68	53.33	23.51	+ 2.3	1.99	0.60	3.70	8.08	5.69	
	Mar. 18	8.83	50.92	26.49	5.8	3.88	0.33	0.98	8.50	4.86	
Washington	Mar. 13	8 13 10.23	302 5 28.40	—1 23.58	+ 3.9	+24 29 25.39	—0.39	+1.29	8 13 9.84	+24 29 26.68	66
	15	9.88	35.35	24.61	4.8	18.57	0.29	1.15	9.59	19.72	
Bessel 341	Feb. 7	8 6 16.60	301 47 55.53	—1 24.04	+ 0.2	+24 46 62.42	—0.61	+3.32	8 6 15.99	+24 46 65.72	62
	8	. .	48 0.43	24.59	1.5	56.77	0.61	3.27	. .	60.04	
	9	15.69	47 59.63	24.57	1.2	57.85	0.61	3.22	15.08	61.07	
	Mar. 13	16.26	54.78	24.48	3.9	59.91	0.36	1.14	15.90	60.05	
	16	16.60	54.58	25.34	6.2	58.67	0.32	0.94	16.28	59.61	
	18	16.18	55.98	27.72	5.8	60.05	0.29	0.81	15.89	60.86	
	19	16.22	57.80	26.49	4.1	58.70	0.28	0.74	15.94	59.44	
Bessel 341	Feb. 11	7 59 24.83	301 42 12.72	—1 25.71	+ 7.9	+24 52 39.20	—0.59	+3.01	7 59 24.24	+24 52 42.21	60
	Mar. 13	24.60	13.38	24.79	3.9	41.62	0.33	1.08	24.27	42.70	
	15	24.18	13.95	25.94	4.8	41.30	0.30	0.94	23.88	42.24	
H. C. 15707	Feb. 11	7 55 16.13	301 39 42.05	—1 25.86	+ 7.9	+24 55 10.02	—0.59	+2.94	7 55 15.54	+24 55 12.96	58
	13	16.16	41.45	25.52	9.6	8.58	0.58	2.83	15.58	11.41	
	14	16.03	46.86	25.94	6.3	6.89	0.58	2.78	15.45	9.67	
	15	16.08	52.71	26.04	4.7	2.74	0.57	2.73	15.51	5.47	
	16	16.00	49.03	25.79	4.9	5.97	0.57	2.68	15.43	8.65	
	Mar. 25	16.02	43.35	25.43	5.0	11.19	0.07	0.25	15.95	11.44	

* Micrometer.

Reduction of stars determined at Santiago—Continued.

Name.	Date.	Obs'd α.	Circle reading.	Refraction.	Nadir.	Observed δ.	Reduct'n to mean equinox, 1852.0. in α.	Reduct'n to mean equinox, 1852.0. in δ.	Mean place for 1852.0. α.	Mean place for 1852.0. δ.	No.
	1852.	h. m. s.	° ′ ″	′ ″	″	° ′ ″	s.	″	h m. s.	° ′ ″	
Bessel 341	Feb. 14	7 55 3.85	301 34 34.23	−1 26.23	+ 6.3	+25 0 19.81	−0.58	+2.75	7 55 3.27	+25 0 22.56	57
	15	3.87	40.58	26.33	4.7	15.16	0.57	2.70	3.30	17.86	
	16	3.87	38.90	26.07	4.9	16.38	0.57	2.64	3.30	19.02	
	17	4.09	35.70	26.46	6.9	17.97	0.56	2.58	3.53	20.55	
	18	3.91	34.33	27.56	6.0	21.34	0.56	2.52	3.35	23.86	
	19	3.95	34.08	26.31	3.5	22.84	0.55	2.46	3.40	25.30	
	20	3.70	38.16	26.07	2.9	19.12	0.55	2.40	3.15	21.52	
	21	3.76	37.45	25.10	6.4	15.36	0.54	2.34	3.22	17.70	
	23	3.73	38.68	26.45	4.6	17.28	0.52	2.21	3.21	19.49	
	Mar. 1	3.36	35.58	25.64	3.8	20.37	0.46	1.78	2.90	22.15	
	2	3.83	33.62	24.68	5.2	19.97	0.45	1.71	3.38	21.68	
	4	3.91	34.82	25.34	5.3	19.33	0.42	1.58	3.49	20.91	
	6	3.43	36.40	25.20	5.0	17.91	0.40	1.46	3.03	19.37	
	7	3.60	34.95	26.07	5.5	19.73	0.39	1.39	3.21	21.12	
	8	3.87	37.10	26.81	5.3	18.52	0.37	1.33	3.50	19.85	
Bessel 341	Feb. 25	7 47 6.21	301 31 54.00	−1 26.04	+ 4.5	+25 3 1.65	−0.48	+2.00	7 47 5.73	+25 3 3.65	49
	26	6.22	52.20	25.07	5.1	1.88	0.47	1.93	5.75	3.81	
	27	6.16	53.88	25.37	5.1	0.50	0.46	1.87	5.66	2.37	
	1851.										
Bessel 275	Dec. 21	9 10 21.60	306 32 11.72	−1 13.58	+14.3	+20 2 21.67	+0.31	+2.10	9 10 21.91	+20 2 23.77	108
	22	21.40	16.90	12.07	10.9	23.29	+0.28	2.21	21.68	25.50	
	1852.										
	Mar. 20	22.23	20.00	11.82	3.9	22.03	−0.54	2.06	21.69	24.09	
	1851.										
Rümker 2800	Dec. 26	9 7 42.79	306 6 55.48	−1 12.77	+10.1	+20 27 41.30	+0.15	+2.73	9 7 42.94	+20 27 44.03	105
	27	43.30	7 1.50	13.47	8.7	43.98	+0.13	2.82	43.43	46.80	
	1852.										
	Mar. 15	42.99	7 0.58	12.93	4.8	41.66	−0.58	2.71	42.41	44.37	
	1851.										
Rümker 2799	Dec. 30	9 7 40.53	305 53 33.70	−1 14.25	+ 8.7	+20 41 5.96	+0.05	+3.13	9 7 40.58	+20 41 9.09	104
	1852.										
	Mar. 13	40.87	35.50	12.77	3.9	7.48	−0.60	2.70	40.27	10.18	
	1851.										
Anon. . .	Dec. 31	9 3 20.27	305 44 23.28	−1 14.35	+ 9.1	+20 57 18.28	+0.02	+3.29	9 3 20.29	+20 57 21.57	99
	1852.										
	Mar. 14	20.80	37 24.18	13.61	3.5	20.04	−0.58	2.62	20.22	22.66	
Bessel 277	Jan. 1	9 3 19.71	305 32 55.70	−1 14.49	+10.4	+21 1 42.50	−0.03	+3.36	9 3 19.68	+21 1 45.86	100
	Mar. 16	20.44	33 0.40	14.17	6.2	41.68	0.55	2.47	19.89	44.15	
Bessel 275	Jan. 2	8 58 16.30	305 28 23.65	−1 14.87	+ 6.9	+21 6 18.43	−0.06	+3.46	8 58 16.24	+21 6 21.89	97
	Mar. 10	17.14	23.98	14.37	5.2	19.30	0.59	2.80	16.55	22.18	
	12	17.05	21.75	13.79	4.5	21.65	0.58	2.67	16.47	24.32	
	18	17.07	24.90	16.56	5.8	19.97	0.51	2.26	16.56	22.23	
	20	16.97	23.38	14.50	3.9	21.33	0.49	2.12	16.48	23.45	
H. C. 18132	Jan. 4	9 4 16.80	305 17 55.48	−1 16.14	+ 5.4	+21 16 49.37	−0.09	+3.53	9 4 16.71	+21 16 52.90	101
	Mar. 19	17.04	57.92	16.17	4.1	48.26	0.53	1.82	16.51	50.08	
	22	16.93	53.90	14.76	5.5	49.47	0.49	1.60	16.44	51.07	
Bessel 278	Jan. 5	8 59 27.31	305 5 28.87	−1 16.13	+ 5.5	+21 29 15.87	−0.13	+3.72	8 59 27.18	+21 29 19.59	98
	Mar. 13	28.11	24.80	14.92	3.9	20.25	0.57	2.53	27.54	22.78	
	15	27.75	27.35	15.70	4.8	17.66	0.55	2.39	27.20	20.05	
Bessel 278	Jan. 6	8 53 47.45	305 0 36.70	−1 15.14	+ 5.9	+21 34 6.65	−0.17	+3.79	8 53 47.28	+21 34 10.44	96
	Mar. 15	47.32	40.48	15.90	4.8	4.73	0.53	2.31	46.79	7.04	
	16	48.06	38.72	15.65	6.2	4.84	0.52	2.25	47.54	7.09	
Bessel 278	Jan. 7	8 50 25.75	304 50 31.10	−1 16.94	+12.4	+21 44 7.55	−0.21	+3.85	8 50 25.54	+21 44 11.40	94
	8	25.74	26.58	17.39	14.8	10.12	0.23	3.89	25.51	14.01	
	Mar. 9	26.21	34.68	15.26	4.1	10.59	0.58	2.63	25.63	13.22	
	10	26.23	35.12	16.13	5.2	9.92	0.57	2.57	25.66	12.49	
	12	26.28	34.62	15.53	4.5	10.52	0.55	2.43	25.73	12.95	
	19	25.98	36.30	17.46	4.1	11.17	0.47	1.95	25.51	13.12	

Reduction of Stars determined at Santiago—Continued.

Name.	Date.	Obs'd α	Circle reading.	Refraction.	Nadir.	Observed δ.	Reduct'n to mean equinox, 1852.0. in α.	Reduct'n to mean equinox, 1852.0. in δ.	Mean place for 1852.0. α.	Mean place for 1852.0. δ.	No.
	1852.	h. m. s.	° ′ ″	′ ″	″	° ′ ″	s.	″	h. m. s.	° ′ ″	
Bessel 278	Jan. 9	8 48 54.61	304 39 43.58	—1 17.56	+12.9	+21 54 55.19	—0.25	+3.92	8 48 54.36	+21 54 59.11	93
	Mar. 13	55.02	50.20	16.06	3.9	56.07	0.53	2.31	54.49	58.38	
Bessel 278	Jan. 10	8 52 13.44	304 32 10.15	—1 17.35	+14.2	+22 2 27.11	—0.26	+4.00	8 52 13.18	+22 2 31.11	95
	Mar. 18	13.62	20.20	19.25	5.8	27.36	0.49	1.88	13.13	29.24	
	20	13.70	20.00	17.12	3.9	27.33	0.47	1.74	13.23	29.07	
Bessel 278	Jan. 11	8 47 33.10	304 25 56.40	—1 18.49	+13.5	+22 8 42.70	—0.30	+4.04	8 47 32.80	+22 8 46.74	92
	April 2	33.07	59.75	18.23	7.7	44.89	0.26	0.83	32.81	45.72	
	6	32.71	55.35	17.15	8.2	47.71	0.20	0.55	32.51	48.26	
Bessel 278	Jan. 14	8 44 15.48	304 0 58.25	—1 18.55	— 0.7	+22 33 55.11	—0.36	+4.15	8 44 15.12	+22 33(59.66)	88
	Mar. 19	15.76	1 17.38	19.87	+ 4.1	32.50	0.45	1.68	15.31	34.18	
	23	15.54	12.80	18.83	5.1	35.04	0.40	1.39	15.14	36.43	
	25	15.71	18.40	18.39	5.0	29.10	0.37	1.25	15.34	30.35	
Bessel 278	Jan. 13	8 45 58.27	304 12 10.78	—1 20.00	+ 0.8	+22 22 42.53	—0.34	+4.11	8 45 57.93	+22 22 46.64	90
	Mar. 25	58.51	5.34	17.86	5.0	41.63	0.37	1.31	58.14	42.94	
	27	58.48	11 56.25	17.77	13.1	42.53	0.35	1.17	58.13	43.70	
H. C. 17513	Jan. 17	8 45 28.48	303 43 19.08	—1 19.32	— 2.1	+22 51 36.45	—0.41	+4.23	8 45 28.07	+22 51 40.68	89
	Mar. 18	28.50	12.90	21.65	+ 5.8	37.06	0.47	1.67	28.03	38.73	
	20	28.08	14.40	19.56	3.9	35.37	0.44	1.63	27.64	37.00	
Bessel 344	Mar. 13	8 35 7.26	303 20 19.52	—1 19.83	+ 3.9	+23 14 30.52	—0.48	+1.83	8 35 6.78	+23 14 32.35	85
	15	6.90	21.22	20.73	4.8	28.82	0.46	1.69	6.44	30.51	
Washi	Mar. 26	8 31 41.30	303 18 35.82	—1 19.87	+ 4.9	+23 16 13.26	—0.29	+0.89	8 31 41.01	+23 16 14.15	82
	27	40.98	33.12	20.35	13.1	8.24	0.28	0.82	40.70	9.06	
	29	41.07	33.62	20.16	8.9	11.75	0.25	0.68	40.82	12.43	
Washington	Mar. 23	8 30 11.90	303 10 28.52	—1 21.28	+ 5.1	+23 24 21.77	—0.33	+1.03	8 30 11.57	+23 24 22.80	80
	25	11.97	30.58	20.78	5.0	19.31	0.29	0.90	11.68	20.21	
	27	12.08	21.88	20.77	13.1	19.90	0.25	0.77	11.83	20.67	

Mean places for 1852.0 *of Comparison-Stars determined at Santiago.*

Reference No	Name.	α.	No. obs.	δ.	No. obs.	Reference No.	Name.	α.	No. obs.	δ.	No. obs.
		h. m. s.		° ′ ″				h. m. s.		° ′ ″	
47	H. C. 15401 .	7 46 36.58	3	+24 44 50.99	3	87	Bessel 341 . .	8 40 17.65	2	+22 44 42.41	2
48	H. C. 15412 .	7 46 57.25	3	24 36 49.06	3	88	Bessel 278 . .	8 44 15.23	4	22 33 33.65	4
49	Bessel 341 . .	7 47 5.71	3	25 3 3.28	3	89	H. C. 17513 .	8 45 27.91	3	22 51 38.80	3
52	Bessel 341 . .	7 48 38.31	5	24 54 11.79	5	90	Bessel 278 . .	8 45 58.07	3	22 22 44.43	3
54	Bessel 339 . .	7 50 59.58	3	24 28 27.10	3	91	Bessel 278 . .	8 47 26.09	4	22 15 15.44	4
55	H. C. 15608 .	7 52 38.37	3	24 18 58.82	3	92	Bessel 278 . .	8 47 32.71	3	22 8 46.91	3
57	Bessel 341 . .	7 55 3.29	15	25 0 20.86	15	93	Bessel 278 . .	8 48 54.43	2	21 54 58.75	2
58	Bessel 341 . .	7 55 15.59	6	24 55 10.27	6	94	Bessel 278 . .	8 50 25.60	6	21 44 12.86	6
60	Bessel 341 . .	7 59 24.13	3	24 52 42.38	3	95	Bessel 278 . .	8 52 13.18	3	22 2 29.81	3
62	Bessel 341 . .	8 6 16.01	6	24 47 0.18	7	96	Bessel 278 . .	8 53 47.20	3	21 34 8.19	3
64	λ Cancri . . .	8 11 43.69	32	24 29 2.83	33	97	Bessel 275 . .	8 58 16.46	5	21 6 22.81	5
66	Washington .	8 13 9.72	2	24 29 21.42	2	98	Bessel 278 . .	8 59 27.31	3	21 29 60.81	3
68	Bessel 344 . .	8 16 8.37	3	24 25 6.04	3	99	Anon. . . .	9 3 20.26	2	20 57 22.12	2
69	H. C. 16464 .	8 16 35.76	2	24 1 31.97	2	100	Bessel 277 . .	9 3 19.79	2	21 1 45.00	2
71	Washington .	8 19 47.03	4	24 9 40.57	4	101	H. C. 18132 .	9 4 16.55	3	21 16 51.35	3
72	Washington .	8 19 49.74	3	24 19 43.20	3	102	Bessel 275 . .	9 4 26.87	3	20 37 38.39	3
73	Washington .	8 20 54.98	2	24 5 30.96	2	103	Bessel 275 . .	9 7 25.78	2	19 51 31.15	2
77	Washington .	8 27 31.61	3	23 58 5.55	3	104	Rümker 2799 .	9 7 40.43	2	20 41 9.64	2
78	Washington .	8 28 2.93	3	23 34 17.26	3	105	Rümker 2800 .	9 7 42.93	3	20 27 45.07	3
79	Bessel 344 . .	8 28 14.64	3	23 45 37.95	3	106	Bessel 275 . .	9 8 14.36	2	19 52 11.65	2
80	Washington .	8 30 11.69	3	23 24 21.23	3	107	Washington .	9 8 14.62	4	20 15 33.84	4
82	Washington .	8 31 40.84	3	23 16 11.88	3	108	Bessel 275 . .	9 10 21.76	3	20 2 24.45	3
85	Bessel 344 . .	8 35 6.61	2	+23 14 31.43	2	109	B. A. C. 3181 .	9 12 17.68	2	+19 42 50.03	2

The Washington observations were reduced by Prof. Yarnall with the aid of special tables, which immediately refer the declinations to the mean equinox for the commencement of the nearest decade, being in almost all cases 1860.0

The declinations, as observed with the mural circle, were usually accompanied, for the sake of identification, by the apparent right-ascension, roughly noted at the time of transit over the middle thread of the instrument, so that the several observations were, for the most part, given in the form of approximate apparent right-ascensions and mean declinations for the epoch 1860.0. The right-ascensions of the first seven stars in the list were determined with the Washington transit-instrument, and reduced also to the mean equinox of 1860.0 by Prof. Lawrence. The right ascensions of the remainder are either estimated for the apparent equinox by the observer, as already mentioned, in which case they are enclosed within parentheses, or in the other cases taken to the nearest second from such sources as were most readily accessible by myself, and referred to the epoch of the declinations. A few star-positions for 1850.0, taken from earlier Washington observations, are incorporated in the list. But all the places, for which the contrary is not specially indicated by parentheses or otherwise, are counted from the mean equinox and equator of 1860.0.

Annexed to the table of observations is a compend analogous to that which follows the Santiago observations, and containing the resultant list of declinations determined by the Naval Observatory. It gives the means of the several determinations as counted from the mean equinox of 1860.0, and also the reductions to the beginning of the year in which the comparison was made. The right-ascensions are, of course, entitled to the same confidence as in the preceding tables from which they are derived. As was the case with the arrangement of the Santiago star-places, the reference-numbers given in the last column of the table of observations denote the number of the star in the special list, and those given in the special list relate to the number in the General Catalogue of Comparison-Stars.

Observations of Comparison-Stars with the Washington mural circle.

Star.	α.	Date.	Mean declination, 1860.0.	Obs'r
	h. m. s.		° ′ ″	
Bessel Z. 396 .	5 3 41.899	1855. Dec. 3	+26 17 8.99	Y.
	41.716	18	8.28	Y.
	41.664	20	8.97	Y.
		30	9.52	Y.
		1856. Jan. 3	7.59	Y.
		4	7.95	Y.
		10	9.29	Y.
		15	9.16	Y.
		16	9.97	Y.
		18	7.83	Y.
		22	9.31	Y.
		23	9.13	Y.
Bessel Z. 405 .	5 11 6.522	1855. Dec. 3	+26 6 32 24	Y.
	6.529	30	31.60	Y.
	6.412	1856. Jan. 3	31.09	Y.
		4	31.63	Y.
		10	31.63	Y.
		15	31.34	Y.
		18	31.46	Y.
		22	32.31	Y.
		23	32.46	Y.
		28	32.75	Y.
Bessel Z. 523 .	5 18 25.222	1855. Dec. 3	+26 27 30.11	Y.
	25.130	18	29.89	Y.
		30	29.74	Y.
		1856. Jan. 3	29.91	Y.
		10	30.80	Y.
		15	31.06	Y.
		18	30.34	Y.
		22	29.73	Y.
		23	31.15	Y.
		28	30.21	Y.
Bessel Z. 405 .	5 22 20.521	1855. Dec. 3	+26 28 20.94	Y.
	20.322	18	19.83	Y.
		30	20.30	Y.
		1856. Jan. 3	20.36	Y.
		4	19.39	Y.
		10	19.78	Y.
		15	20.67	Y.
		18	20.33	Y.
		22	19.54	Y.
		23	20.96	Y.
		28	19.80	Y.
Bessel Z. 405 .	5 30 14.012	1855. Dec. 3	+26 31 57.08	Y.
	14.035	18	56.08	Y.
	13.866	20	56.44	Y.
		30	57.91	Y.
		1856. Jan. 3	56.74	Y.
		10	56.67	Y.
		15	57.44	Y.
		16	57.69	Y.
		18	57.30	Y.
		22	57.10	Y.
		23	57.49	Y.
		28	+ 26 31 57.09	Y.

Star.	α.	Date.	Mean declination, 1860.0.	Obs'r
	h. m. s.		° ′ ″	
Bessel Z. 405 .	5 46 56.049	1855. Dec. 3	+26 27 0.71	Y.
		18	26 59.57	Y.
		30	59.63	Y.
		1856. Jan. 3	59 37	Y.
		10	26 58 90	Y.
		15	27 1.19	Y.
		18	0.82	Y.
		22	0.14	Y.
		23	1.64	Y.
		28	27 0.12	Y.
Rümker 1673 .	5 54 44.989	1855. Dec. 3	+26 16 36.00	Y.
		18	35.98	Y.
		30	36.26	Y.
		1856. Jan. 3	36.13	Y.
		10	35.09	Y.
		15	35.80	Y.
		18	36.03	Y.
		22	36.29	Y.
		23	36.27	Y.
		28	36.00	Y.
Rümker 1680 .	5 55 8.8	1855. Dec. 3	+26 21 5.68	Y.
		18	5.77	Y.
		30	5.43	Y.
		1856. Jan. 3	5.57	Y.
		4	5.25	Y.
		10	5.51	Y.
		15	6.48	Y.
		18	6.25	Y.
		22	7.50	Y.
		3	6.82	Y.
		28	6.64	Y.
W. O.	8 13 39	April 6	+24 27 56.20	
		8	55.25	
Bessel Z. 344 .	8 16 37	April 6	+24 23 36.29	
		8	34.91	
Lal. 16164 . .	8 17 5	April 9	+24 0 2.08	
Bessel Z. 344 . .	8 28 43	April 9	+23 44 0.00	
W. O.	8 30 40	April 6	+23 22 44.75	
Bessel Z. 344 . .	8 35 35	April 6	+23 12 51.83	
		8	51.26	
Bessel Z. 278 . .	8 46 26	April 8	+22 20 59.44	
		18	59.43	
Bessel Z. 278 . .	8 47 54	April 6	+22 13 29.11	
Bessel Z. 278 . .	8 50 54	April 11	+21 42 25.27	
Bessel Z 278 . .	8 52 40	April 18	+22 0 39.67	
Bessel Z. 278 . .	8 54 15	April 6	+21 32 19.25	
		8	18.01	
Bessel Z. 275 . .	8 58 44	April 6	+21 4 31.03	
		8	30.85	
Bessel Z. 278 . .	8 59 55	April 11	+21 27 30.39	
		18	30.20	
W. O.	9 8 42	April 8	+20 13 37.41	
Bessel Z. 275 . .	9 4 54	April 11	+20 35 43.67	

Observations of Comparison-Stars with the Washington mural circle—Continued.

Star.	α.	Date.	Mean declination, 1860.0.	Obs'r.	Star.	α.	Date.	Mean declination, 1860.0.	Obs'r.
	h. m. s.	1856.	° ′ ″			h. m. s.	1856.	° ′ ″	
W. O. . . .	9 10 49	April 6	+20 0 27.81			(17 25 38)	May 20	—17 44 0.15	Y.
		11	26.77				22	0.32	Y.
Piazzi IX, 50 .	9 12 45	April 18	+19 40 52.63				28	0.73	Y.
							June 3	0.39	Y.
	(16 41 19)	May 20	—26 29 36.48	Y.			18	0.85	Y.
		22	36.90	Y.		(17 29 10)	May 20	—27 57 25.59	Y.
		June 3	37.96	Y.			21	26.66	M.
		18	36.85	Y.			22	25.43	Y.
		July 1	36.88	Y.			June 20	26.26	M.
		4	37.06	Y.		(17 32 21)	June 3	—18 0 15.29	Y.
		10	36.92	Y.			18	15.43	Y.
	(16 43 21)	May 20	—26 40 38.66	Y.			19	15.63	Y.
		22	39.14	Y.		(17 39 5)	May 20	—18 3 0.43	Y.
		28	37.58	Y.			22	3 0.53	Y.
		June 21	38.87	Y.			23	2 59.93	M.
	(16 49 36)	June 3	—26 53 25.06	Y.			June 3	3 0.44	Y.
		19	23.99	Y.			18	0.49	Y.
		21	24.43	Y.			19	0.73	Y.
		July 1	24.56	Y.		(17 44 18)	May 20	—28 1 10.01	Y.
	(16 50 30)	June 3	—26 57 37.84	Y.			21	9.68	M.
		19	36.67	Y.			22	10.67	Y.
		21	37.96	Y.			June 19	9.92	Y.
		July 1	37.12	Y.		(17 46 42)	May 28	—18 15 41.16	Y.
	(16 52 24)	May 20	—27 2 17.89	Y.			June 2	39.56	Y.
		21	18.29	M.			18	39.93	Y.
		22	18.39	Y.			20	39.52	M.
		June 18	18.34	Y.		(17 47 40)	May 21	—28 2 17.50	M.
	(16 55 6)	May 20	—27 0 38.73	Y.			22	18.28	Y.
		21	40.07	M.			June 3	18.86	Y.
		22	39.60	Y.			19	17.79	Y.
		June 18	38.51	Y.		(17 52 49)	May 23	—27 52 5.62	M.
	(17 0 9)	May 22	—27 12 41.09	Y.			28	6.00	Y.
		23	39.74	M.			June 19	6.28	Y.
		28	41.00	Y.			20	7.16	M.
		June 18	40.35	Y.		(17 53 53)	May 21	—27 49 17.16	M.
	(17 7 32)	May 20	—27 23 56.32	Y.			22	17.18	Y.
		22	55.79	Y.			June 3	17.91	Y.
		June 3	55.18	Y.			July 1	17.25	Y.
		19	54.32	Y.		(17 56 20)	May 22	—27 50 14.01	Y.
	(17 11 34)	May 23	—17 36 21.32	M.			28	13.93	Y.
		June 18	23.00	Y.			June 3	13.74	Y.
		20	21.96	M.			July 1	13.42	Y.
		27	21.44	M.		(17 59 26)	May 22	—27 39 26.84	Y.
	(17 13 16)	May 20	—27 51 34.32	Y.			23	28.04	M.
		21	36.10	M.			June 18	27.14	Y.
		22	35.12	Y.			July 4	28.93	Y.
		July 14	36.40	M.		(18 0 15)	June 2	—27 45 2.73	M.
		17	34.85	Y.			3	4.29	Y.
	(17 13 46)	June 3	—27 32 7.01	Y.			19	2.48	Y.
		19	5.35	Y.			July 1	2.99	Y.
		July 10	7.69	Y.		(18 4 32)	May 28	—25 10 50.45	Y.
		15	7.09	Y.			June 3	51.56	Y.
	(17 14 17)	June 21	—27 50 43.70	Y.			19	51.36	Y.
							July 1	49.94	Y.
	(17 14 16)	May 28	—17 33 46.62	Y.		(18 5 11)	June 2	—27 32 5.23	M.
		June 18	46.79	Y.			18	6.89	Y.
		20	46.59	M.			21	6.66	Y.
		27	45.81	M.			July 1	5.71	Y.

Observations of Comparison-Stars with the Washington mural circle—Continued.

Star.	α.	Date.	Mean declination, 1860.0.	Obs'r.
	h. m. s.	1856.	° ′ ″	
	(18 7 4)	May 23	−25 45 0.64	M.
		June 20	2.62	M.
		July 14	3.23	M.
		15	1.99	Y.
	(18 7 24)	May 21	−27 27 14.37	M.
		22	13.05	Y.
		July 10	15.15	Y.
	(18 9 5)	May 30	−27 5 19.94	Y.
		June 3	20.06	Y.
		27	20.72	Y.
		July 17	22.04	Y.
	(18 9 25)	June 18	−18 50 41.15	Y.
		19	41.42	Y.
		July 4	42.62	Y.
	(18 9 49)	May 28	−25 59 3.08	Y.
		June 21	2.76	Y.
		July 1	2.46	Y.
	(18 12 19)	May 20	−26 8 33.06	Y.
		22	33.43	Y.
		July 15	33 77	Y
	(18 12 57)	June 18	−18 55 4.68	Y.
		19	5.78	Y.
		July 15	6.67	Y.
	(18 13 26)	May 30	−26 28 38.29	Y.
		July 1	38.85	Y.
		10	39.07	Y.
		17	38.92	Y.

Star.	α.	Date.	Mean declination, 1860.0.	Obs'r.
	h. m. s.	1856.	° ′ ″	
	(18 15 44)	May 28	−26 33 41.65	Y.
		30	42.13	Y.
		June 3	42.33	Y.
		18	41.91	Y.
		21	42.52	Y.
	(17 21 37)	May 20	−17 41 44.21	Y.
		22	44.40	Y.
		23	44.78	Y.
	(18 18 47)	May 20	−26 42 45.29	Y.
		21	46.31	M.
		22	46.35	Y.
		23	46.55	Y.
	(18 24 3)	May 20	−19 4 5.95	Y.
		22	6.56	Y.
		June 2	6.96	M.
		3	6.27	Y.
			Mean declination, 1850.0.	
		1853.		
	(18 18 34)	Aug. 8	−26 43 2.86	
		12	2.41	
		19	2.50	
		1854.		
		Sept. 2	3.91	

Mean declinations of Comparison-Stars determined at Washington.

No.	Name.	Mean place, 1860.0. α.	Mean place, 1860.0. δ.	No. obs.	Year of comp.	Red. in α.	Mean δ for beg. of year.	Red. in δ.
		h. m. s.	° ′ ″			s.	° ′ ″	′ ″
2	Bessel 396	5 3 41.760	+26 17 8.83	12	1850	−37.12	+26 16 19.79	−0 49.04
3	Bessel 405	5 11 6.488	26 6 31.85	10	1850	37.12	26 5 49.12	0 42.73
4	Bessel 523	5 18 25.176	26 27 30.29	10	1850	37.26	26 26 53.83	0 36.46
5	Bessel 405	5 22 20.422	26 28 20.17	11	1850	37.28	26 27 47.09	0 33.08
8	Bessel 405	5 30 13.971	26 31 57.08	12	1849	41.06	26 31 28.18	0 28.90
11	Bessel 405	5 46 56.049	26 27 0.22	10	1849	41.10	26 26 47.32	0 12.90
13	Rümker 1673	5 54 44.989	26 16 35.98	10	1849	41.05	26 16 30.60	0 5.38
14	Rümker 1680	5 55 8.80	26 21 6.08	11	1849	41.07	26 21 1.08	−0 5.00
66	W. O.	8 13 39	24 27 55.72	2	1852	. .	24 29 23.94	+1 28.22
68	Bessel 344	8 16 37	24 23 35.60	2	1852	. .	24 25 5.54	1 29.94
69	Lalande 16464	8 17 5	24 0 2.08	1	1852	. .	24 1 32.29	1 30.21
79	Bessel 344	8 28 43	23 44 0.00	1	1852	. .	23 45 36.83	1 36.83
80	W. O.	8 30 40	23 22 44.75	1	1852	. .	23 24 22.66	1 37.91
85	Bessel 344	8 35 35	23 12 51.54	2	1852	. .	23 14 32.17	1 40.63
90	Bessel 278	8 46 26	22 20 59.44	2	1852	. .	22 22 45.86	1 46.42
91	Bessel 278	8 47 54	22 13 29.11	1	1852	. .	22 15 16.30	1 47.19
94	Bessel 278	8 50 54	21 42 25.27	2	1852	. .	21 44 14.01	1 48.74
95	Bessel 278	8 52 40	22 0 39.67	1	1852	. .	22 2 27.26	1 47.59
96	Bessel 278	8 54 15	21 32 18.63	2	1852	. .	21 34 9.08	1 50.45
97	Bessel 275	8 58 44	21 4 30.94	2	1852	. .	21 6 23.57	1 52.63
98	Bessel 278	8 59 55	21 27 30.30	2	1852	. .	21 29 23.59	1 53.29
102	Bessel 275	9 4 54	20 35 43.67	1	1851	. .	20 37 53.86	2 10.19
107	W. O.	9 8 42	20 13 37.41	1	1851	. .	20 15 49.85	2 12.44
108	W. O.	9 10 49	20 0 27.29	2	1851	. .	20 2 40.67	2 13.38
109	Piazzi IX 50	9 12 45	+19 40 52.63	1	1851	. .	+19 43 7.03	2 14.40
110	. . . .	16 41 32	−26 29 37.01	7	1850	. .	−26 28 29.65	1 7.36
111	. . . .	16 43 33	26 40 38.56	4	1852	. .	26 39 32.64	1 5.92
112	. . . .	16 49 49	26 53 24.51	3	1850	. .	26 52 23.79	1 0.72
113	. . . .	16 50 42	26 57 37.40	3	1850	. .	26 56 37.42	0 59.98
114	. . . .	16 52 36	27 2 18.23	4	1850	. .	27 1 19.84	0 58.39
115	. . . .	16 55 19	27 0 39.23	4	1850	. .	26 59 43.12	0 56.11
116	. . . .	17 0 21	27 12 40.55	4	1850	. .	27 11 48.68	0 51.87
117	. . . .	17 7 45	27 23 55.40	4	1850	. .	27 23 9.80	0 45.60
118	. . . .	17 11 44	17 36 21.93	4	1851	. .	17 35 44.00	0 37.93
119	. . . .	17 13 28	27 51 35.36	5	1850	. .	27 50 54.67	0 40.69
120	. . . .	17 14 0	27 32 6.71	4	1850	. .	27 31 26.46	0 40.25
121	. . . .	17 14 29	27 50 43.70	1	1851	. .	27 49 3.87	0 39.83
122	. . . .	17 14 26	17 33 46.45	4	1851	. .	17 33 10.60	0 35.85
124	. . . .	17 25 49	17 44 0.49	5	1851	. .	17 43 34.25	0 26.24
125	. . . .	17 29 23	27 57 25.99	4	1850	. .	27 56 59.01	0 26.98
126	. . . .	17 32 32	18 0 15.45	3	1851	. .	17 59 53.68	0 21.77
127	. . . .	17 39 16	18 3 0.43	6	1851	. .	18 2 43.91	0 16.52
128	. . . .	17 44 30	28 1 10.07	4	1850	. .	28 0 56.27	0 13.80
129	. . . .	17 46 55	18 15 40.04	4	1851	. .	18 15 29.52	0 10.52
130	. . . .	17 47 52	28 2 18.11	4	1850	. .	28 2 7.21	0 10.90
131	. . . .	17 53 2	27 52 6.27	4	1850	. .	27 51 59.93	0 6.34
132	. . . .	17 54 6	27 49 17.38	4	1850	. .	27 49 12.06	0 5.32
133	. . . .	17 56 32	27 50 13.78	4	1850	. .	27 50 10.47	0 3.31
134	. . . .	17 59 38	27 39 27.74	4	1850	. .	27 39 27.14	+0 0.60
135	. . . .	18 0 28	27 45 3.12	4	1850	. .	27 45 3.25	−0 0.13
136	. . . .	18 4 44	25 10 50.83	4	1850	. .	25 10 54.71	0 3.88
137	. . . .	18 5 24	27 32 6.12	4	1850	. .	27 32 10.56	0 4.44
138	. . . .	18 7 17	25 45 2.12	3	1850	. .	25 45 8.23	0 6.11
139	. . . .	18 7 38	27 27 14.19	3	1850	. .	27 27 20.72	0 6.53
140	. . . .	18 9 18	27 5 20.69	4	1850	. .	27 5 28.55	0 7.86
141	. . . .	18 9 38	18 50 41.73	3	1851	. .	18 50 49.10	0 7.37
142	. . . .	18 10 7	25 59 2.77	3	1850	. .	25 59 11.27	0 8.50
143	. . . .	18 12 30	26 8 33.42	3	1850	. .	26 8 44.09	0 10.67
144	. . . .	18 13 10	18 55 5.71	3	1851	. .	18 55 15.85	0 10.14
145	. . . .	18 13 38	26 28 38.78	4	1850	. .	26 28 50.43	0 11.65
146	. . . .	18 15 56	26 33 42.09	5	1850	.	26 33 55.76	0 13.67
147	. . . .	18 19 0	26 42 46.13	8	1850	.	26 43 2.69	0 16.56
148	. . . .	18 24 15	−19 4 6.69	4	1851	.	−19 4 25.54	−0 18.85

For No. 121 the δ is assumed to be −27° 49′ instead of −27° 50′.

Ninety-three observations of comparison-stars were afforded by Bessel's zones, and are here appended, and reduced to the mean equinoxes of 1825.0, and of the commencement of the year of comparison. The reference-numbers are to the General Catalogue.

Comparison-Stars from Bessel's Zones.

N°. zone.	Mag.	Observed		Reduction to 1825.0.		Mean place, 1825.0.		Year of comp.	Reduction to beginning of year.		Mean place.		No.
		α.	δ.	α.	δ.	α.	δ.		α.	δ.	α.	δ.	
		h. m. s.	° ′ ″	s.	″	h. m. s.	° ′ ″		m. s.	′ ″	h. m. s.	° ′ ″	
62	7	7 31 42.30	+14 37 49.1	+28.72	−74.0	7 32 11.02	+14 36 35.1	1852	+1 31.53	−3 33.6	7 33 42.55	+14 33 1.5	42
146	8	7 27 50.30	14 44 34.7	7.00	63.3	7 27 57.30	14 43 31.4	1852	1 31.67	3 24.5	7 29 28.97	14 40 6.9	38
	7	7 32 3.70	14 37 37.8	6.98	63.9	7 32 10.68	14 36 33.9	1852	1 31.53	3 33.6	7 33 42.21	14 33 0.3	42
273	9	7 27 52.20	15 28 49.1	3.82	44.6	7 27 56.02	15 28 4.5	1852	1 32.13	3 24.4	7 29 28.15	15 24 40.1	37
	9.10	7 29 2.38	14 57 48.8	3.83	45.3	7 29 6.21	14 57 3.5	1852	1 31.79	3 26.9	7 30 38.00	14 53 36.6	39
	8	7 29 22.60	14 51 52.2	3.83	45.4	7 29 26.43	14 51 6.8	1852	1 31.72	3 27.7	7 30 58.15	14 47 39.1	40
	8	7 31 8.36	15 44 36.8	3.81	44.2	7 31 12.17	15 43 52.6	1852	1 32.24	3 31.5	7 32 44.41	15 40 21.1	41
	9	7 32 13.43	15 54 8.7	3.80	43.7	7 32 17.23	15 53 25.0	1852	1 32.32	3 33.9	7 33 49.55	15 49 51.1	43
	9	7 51 55 66	16 2 59.1	3.75	42.0	7 51 59.41	16 2 17.1	1852	1 32.03	4 15.8	7 53 31.44	15 58 1.3	56
	9	8 10 16.16	16 1 22.4	3.70	40.8	8 10 19.86	16 0 41.6	1852	1 31.59	4 53.1	8 11 51.45	15 55 48.5	65
	8	8 13 23.89	15 50 13.8	3.70	41.0	8 13 27.59	15 49 32.8	1852	1 31.40	4 59.3	8 14 58.99	15 44 33.5	67
	7.8	8 22 49.95	15 52 17.3	3.68	40.3	8 22 53.63	15 51 37.0	1852	1 31.18	5 17.6	8 24 24.81	15 46 19.4	75
	8.9	8 25 23.48	16 20 9.7	3.67	39.4	8 25 27.15	16 19 30.3	1852	1 31.37	5 22.5	8 26 58.52	16 14 7.8	76
274	9	8 30 48.50	18 52 21.9	4.13	36.3	8 30 52.63	18 51 45.6	1852	1 32.60	5 32.7	8 32 25.23	18 46 12.9	83
	9	8 30 59 02	19 6 52.0	4.12	35.9	8 31 3.14	19 6 16.1	1852	1 32.73	5 33.1	8 32 35.87	19 0 43.0	84
	9	8 37 48.40	18 42 4.3	4.12	36.0	8 37 52.52	18 41 28.3	1852	1 32.28	5 45.6	8 39 24.80	18 35 42.7	86
275	8	8 56 39.01	21 13 12.3	4.48	29.2	8 56 43.49	21 12 43.1	1852	1 32.89	6 18.7	8 58 16.38	21 6 24.4	97
	8.9	9 1 42.19	21 8 39.1	4.48	29.1	9 1 46.67	21 8 10.0	1852	1 32.66	6 27.1	9 3 19.33	21 1 42.9	100
	9	9 2 49.60	20 44 34.3	4.48	29.6	9 2 54.08	20 44 4.7	1851	1 28.96	6 14.5	9 4 23.04	20 37 50.2	102
	9	9 5 49.10	19 58 32.6	4.49	30.6	9 5 53.59	19 58 2.0	1851	1 28.48	6 19.2	9 7 22.07	19 51 42.8	103
	9	9 6 37.63	19 59 13.4	4.49	30.6	9 6 42.12	19 58 42.8	1851	1 28.45	6 20.5	9 8 10.57	19 52 22.3	106
	9	9 8 45.72	20 9 29.1	4.48	30.2	9 8 50.20	20 8 58.9	1851	1 28.44	6 23.8	9 10 18.62	20 2 35.1	108
276	9	7 25 15.60	15 19 5.3	4.42	45.2	7 25 20.02	15 18 20.1	1852	1 32.17	3 18.7	7 26 52.19	15 15 1.4	36
	8.9	7 27 51.92	15 28 53.6	4.40	44.9	7 27 56.32	15 28 8.7	1852	1 32.13	3 24.4	7 29 28.45	15 24 44.3	37
	8	7 31 7.64	15 44 38.9	4.39	44.5	7 31 12.03	15 43 54.4	1852	1 32.24	3 31.5	7 32 44.27	15 40 22.9	41
277	8.9	9 1 43.50	21 4 18.8	4.01	30.3	9 1 47.51	21 3 48.5	1852	1 32.62	6 27.2	9 3 20.13	20 57 21.3	99
	8.9	9 1 43.02	21 8 41.1	4.02	30.2	9 1 47.04	21 8 10.9	1852	1 32.66	6 27.1	9 3 19.70	21 1 43.8	100
278	9	7 57 34.80	22 55 45.7	4.28	31.2	7 57 39.08	22 55 14.5	1852	1 36.16	4 27.6	7 59 15.24	22 50 46.9	59
	8	8 8 34.80	22 2 25.5	4.28	31.8	8 8 39.08	22 1 53.7	1852	1 35.22	4 49.9	8 10 14.30	21 57 3.8	63
	7	8 17 50.50	21 43 54.6	4.25	31.8	8 17 54.75	21 43 22.8	1852	1 34.71	5 8.1	8 19 29.46	21 38 14.7	70
	8	8 33 27.60	23 20 40.2	4.18	29.0	8 33 31.78	23 20 11.2	1852	1 35.05	5 37.7	8 35 6.83	23 14 33.5	85
	9	8 42 36.40	22 39 58.4	4.17	29.4	8 42 40.57	22 39 29.0	1852	1 34.27	5 54.3	8 44 14.84	22 33 34.7	88
	8.9	8 43 49.43	22 58 4.9	4.16	29.0	8 43 53.59	22 57 35.9	1852	1 34.42	5 56.5	8 45 28.01	22 51 39.4	89
	8	8 44 6.32	22 53 5.6	4.16	29.1	8 44 10.48	22 52 36.5	1852	1 34.36	5 57.0	8 45 44.84	22 46 39.5	s
	8	8 44 19.57	22 29 12.1	4.17	29.6	8 44 23.74	22 28 42.5	1852	1 34.10	5 57.3	8 45 57.84	22 22 45.2	90
	8	8 45 48.00	22 21 44.7	4.16	29.7	8 45 52.16	22 21 15.0	1852	1 33.96	6 0.0	8 47 26.12	22 15 15.0	91
	9	8 45 54.74	22 15 16.2	4.17	29.8	8 45 58.91	22 14 46.4	1852	1 33.93	6 0.1	8 47 32.84	22 8 46.3	92
	8	8 47 16.60	22 1 29.9	4.17	30.0	8 47 20.77	22 0 59.9	1852	1 33.72	6 2.5	8 48 54.49	21 54 57.4	93
	7.8	8 48 47.88	21 50 50.8	4.16	30.2	8 48 52.04	21 50 20.6	1852	1 33.56	6 5.2	8 50 25.60	21 44 15.4	94
	8	8 50 34.50	22 9 15.5	4.15	29.8	8 50 38.65	22 8 38.9	1852	1 33.64	6 8.3	8 52 12.29	22 2 30.6	95
	9	8 52 10.00	21 40 50.8	4.16	30.3	8 52 14.16	21 40 20.5	1852	1 33.32	6 11.0	8 53 47.48	21 34 9.5	96
	7	8 56 39.20	21 13 16.5	4.16	30.5	8 56 43.36	21 12 46.0	1852	1 32.89	6 18.7	8 58 16.25	21 6 27.3	97
	9	8 57 50.07	21 36 11.4	4.15	30.1	8 57 54.22	21 35 41.3	1852	1 33.03	6 20.7	8 59 27.25	21 29 20.6	98
	9	9 1 43.72	21 4 17.2	4.14	30.6	9 1 47.86	21 3 46.6	1852	1 32.62	6 27.2	9 3 20.45	20 57 19.4	99
	9	9 1 42.83	21 8 45.0	4.15	30.5	9 1 46.98	21 8 14.4	1852	1 32.66	6 27.1	9 3 19.64	21 1 47.3	100
	8.9	9 2 39.60	21 23 52.2	4.14	30.2	9 2 43.74	21 23 22.0	1852	1 32.75	6 28.7	9 4 16.49	21 16 53.3	101
279	9	7 57 34.82	22 55 44.3	4.63	32.7	7 57 39.45	22 55 11.5	1852	1 36.16	4 27.6	7 59 15.61	22 50 43.9	59
339	7	7 37 48.59	23 34 15.1	16.44	19.2	7 38 5.03	23 33 55.9	1852	1 37.21	3 46.5	7 39 42.24	23 30 9.4	i
	8	7 39 57.70	24 10 21.6	16.41	18.1	7 40 14.11	24 13 3.5	1852	1 37.56	3 51.1	7 41 51.67	24 9 12.5	45
	7	7 42 20.26	22 46 51.3	16.48	19.6	7 42 36.74	22 46 31.7	1852	1 36.53	3 56.1	7 44 13.27	22 42 35.6	k
	7.8	7 45 21.02	24 4 56.8	16.42	17.6	7 45 37.44	24 4 40.4	1852	1 37.30	4 2.5	7 47 14.74	24 0 37.9	50
	9	7 46 44.20	+24 58 31.1	+16.38	−16.2	7 47 0.58	+24 58 14.9	1852	+1 37.86	−4 5.3	7 48 38.44	+24 54 9.6	52

Comparison-Stars from Bessel's Zones—Continued.

Nº. zone.	Mag.	Observed α.	Observed δ.	Reduction to 1825.0. α.	Reduction to 1825.0. δ.	Mean place, 1825.0. α.	Mean place, 1825.0. δ.	Year of comp.	Reduction to beginning of year. α.	Reduction to beginning of year. δ.	Mean place. α.	Mean place. δ.	No.
		h. m. s.	° ′ ″	m. s.	″	h. m. s.	° ′ ″		m. s.	′ ″	h. m. s.	° ′ ″	
339	9	7 49 5.28	+24 32 54.8	+16.40	—16.6	7 49 21.68	+24 32 38.2	1852	+1 37.49	—4 10.4	7 50 59.17	+24 28 27.8	54
	8	7 50 44.60	24 23 29.2	16.41	16.3	7 51 1.01	24 23 12.9	1852	1 37.36	4 13.9	7 52 38.37	24 18 59.0	55
	9	7 53 21.74	24 59 42.6	16.39	15.3	7 53 38.13	24 59 27.3	1852	1 37.68	4 19.3	7 55 15.81	24 55 8.0	58
	8	7 55 57.20	22 57 21.5	16.48	17.1	7 56 13.68	22 57 4.4	1852	1 36.24	4 24.7	7 57 49.92	22 52 39.7	*l*
341	8	7 45 5.38	25 7 19.8	22.24	17.6	7 45 27.62	25 7 2.2	1852	1 38.02	4 2.2	7 47 5.64	25 3 0.0	49
	9	7 46 38.15	24 58 31.7	22.25	17.6	7 47 0.40	24 58 14.1	1852	1 37.86	4 5.3	7 48 38.26	24 54 8.8	52
	9	7 53 2.95	25 4 58.7	22.24	16.7	7 53 25.19	25 4 42.0	1852	1 37.72	4 18.8	7 55 2.91	25 0 23.2	57
	8	7 53 15.47	24 59 46.2	22.25	16.8	7 53 37.72	24 59 29.4	1852	1 37.68	4 19.3	7 55 15.40	24 55 10.1	58
	9	7 57 24.70	24 57 23.7	22.25	16.5	7 57 46.95	24 57 7.2	1852	1 37.47	4 27.8	7 59 24.42	24 52 39.4	60
	9	8 4 16.22	24 51 58.9	22.26	15.9	8 4 38.48	24 51 43.0	1852	1 37.16	4 41.8	8 6 15.64	24 47 1.2	62
	7.8	8 15 52.20	25 6 18.7	22.24	14.1	8 16 14.44	25 6 4.6	1852	1 36.88	5 4.9	8 17 51.32	25 0 59.7	*m*
344	7	8 9 43.30	24 34 8.2	22.33	14.0	8 10 6.63	24 33 54.2	1852	1 36.76	4 52.8	8 11 43.39	24 29 1.4	64
	8	8 14 8.58	24 30 16.7	23.34	13.5	8 14 31.92	24 30 3.2	1852	1 36.54	5 1.5	8 16 8.46	24 25 1.7	68
	8.9	8 14 36.01	24 6 49.1	23.36	14.0	8 14 59.37	24 6 35.1	1852	1 36.28	5 2.4	8 16 35.65	24 1 32.7	69
	8	8 15 51.10	25 6 17.1	23.32	12.6	8 16 14.42	25 6 4.5	1852	1 36.88	5 4.9	8 17 51.30	25 0 59.6	*m*
	6.7	8 20 45.17	24 40 1.7	23.33	12.4	8 21 8.50	24 39 49.3	1852	1 36.40	5 14.4	8 22 44.90	24 34 34.9	*o*
	7	8 22 15.26	24 40 34.2	23.34	12.3	8 22 38.60	24 40 21.9	1852	1 36.34	5 17.2	8 24 14.94	24 35 4.7	*p*
	9	8 26 15.71	23 51 18.4	23.37	13.0	8 26 39.08	23 51 5.4	1852	1 35.64	5 24.8	8 28 14.72	23 45 40.6	79
	9	8 33 8.40	23 20 20.0	23.38	12.5	8 33 31.78	23 20 7.5	1852	1 35.05	5 37.7	8 35 6.83	23 14 29.8	85
	9	8 38 20.13	22 50 41.2	23.40	12.7	8 38 43.53	22 50 28.5	1852	1 34.57	5 47.2	8 40 18.10	22 44 41.3	87
	8.9	8 43 47.23	22 52 48.9	23.39	12.2	8 44 10.62	22 52 36.7	1852	1 34.33	5 57.0	8 45 44.95	22 46 39.7	*s*
345	9	8 43 24.35	22 57 45.6	29.27	12.6	8 43 53.62	22 57 33.0	1852	1 34.42	5 56.5	8 45 28.04	22 51 36.5	89
	8	8 43 41.22	22 52 50.7	29.27	12.3	8 44 10.49	22 52 38.4	1852	1 34.33	5 57.0	8 45 44.82	22 46 41.4	*s*
348	7	6 0 16.60	24 27 24.9	31.79	32.1	6 0 48.39	24 26 52.8	1849	1 28.28	0 3.2	6 2 16.67	24 26 49.6	*g*
	9	6 16 45.35	24 21 38.5	31.72	29.7	6 17 17.07	24 21 8.8	1849	1 28.16	0 37.8	6 18 45.23	24 20 31.0	24
	9	6 25 21.15	24 34 12.6	31.67	28.1	6 25 52.82	24 33 44.5	1849	1 28.25	0 55.8	6 27 21.07	24 32 48.7	32
	9	6 25 52.91	24 32 29.5	31.67	28.1	6 26 24.58	24 32 1.4	1849	1 28.22	0 56.9	6 27 52.80	24 31 4.5	33
	9	6 26 46.22	24 58 47.5	+31.65	27.5	6 27 17.87	24 58 20.0	1849	1 28.52	0 58.7	6 28 46.39	24 57 21.3	34
396	8	4 55 42.20	26 11 28.9	—37.60	49.9	4 55 4.60	26 10 39.0	1850	1 32.59	+2 18.6	4 56 37.19	26 13	1
	8	5 2 9.58	26 14 59.7	37.66	48.1	5 1 31.92	26 14 11.6	1850	1 32.76	2 4.9	5 3 4.68	26 16 16.5	2
405	9	5 10 6.40	26 4 44.7	53.23	42.2	5 9 13.17	26 4 2.5	1850	1 32.75	1 48.8	5 10 29.92	26 5 51.3	3
	7.8	5 19 23.63	25 0 36.8	53.19	40.6	5 18 30.44	24 59 56.2	1850	1 32.13	1 28.6	5 20 2.57	25 1 24.8	*c*
	9	5 21 3.27	26 27 2.7	53.35	38.5	5 20 9.92	26 26 24 2	1850	1 33.17	1 25.0	5 21 43.09	26 27 49.2	5
	8	5 21 56.13	26 33 19.4	53.37	33.4	5 21 2.76	26 32 46.0	1849	1 29.50	1 19.9	5 22 32.26	26 34 5.9	6
	9	5 25 4.06	26 26 26.6	53.38	37.4	5 24 10.68	26 25 49.2	1849	1 29.46	1 13.4	5 25 40.14	26 27 2.6	7
	7	5 27 6.77	26 48 59.0	53.43	36.4	5 26 13.34	26 48 22.6	1850	1 33.51	1 12.0	5 27 46.85	26 49 34.6	*d*
	7	5 28 57.02	26 31 0.4	53.40	36.1	5 28 3.62	26 30 24.3	1849	1 29.57	1 5.4	5 29 33.19	26 31 29.7	8
	7	5 29 47.16	25 48 0.3	53.34	36.6	5 28 53.82	25 47 23.7	1849	1 29.07	1 3.6	5 30 22.89	25 48 27.3	*e*
	9	5 45 38.81	26 26 48.7	53.51	31.2	5 44 45.30	26 26 17.5	1849	1 29.63	0 30.4	5 46 14.93	26 26 47.9	11
	9	5 53 52.68	26 21 17.7	53.55	28.8	5 52 59.13	26 20 48.9	1849	1 29.59	+0 13.2	5 54 28.72	26 21 2.1	14
	8.9	6 0 54.82	26 2 45.0	53.55	27.0	6 0 1.27	26 2 18.0	1849	1 29.37	—0 1.6	6 1 30.64	26 2 16.4	15
	9	6 1 46.40	26 1 14.0	53.55	26.7	6 0 52.85	26 0 47.3	1849	1 29.35	0 3 4	6 2 22.20	26 0 43.9	16
	9	6 10 56.16	25 46 35.8	53.57	24.2	6 10 2.59	25 46 11.6	1849	1 29.16	0 22.6	6 11 31.75	25 45 49.0	20
	7	6 14 50.64	25 8 15.3	53.53	23.7	6 13 57.11	25 7 51.6	1849	1 28.71	0 30.8	6 15 25.82	25 7 20.8	21
	9	6 16 11.49	25 36 23.5	53.58	22.8	6 15 17.91	25 35 47.0	1849	1 29.02	0 21.2	6 16 46.93	25 35 25.8	22
	8.9	6 25 9.70	25 3 12.3	53.56	20.7	6 24 16.14	25 2 51.6	1849	1 28.60	0 52.4	6 25 44.74	25 1 59.2	30
	9	6 28 11.40	24 58 44.6	53.57	19.8	6 27 17.83	24 58 24.8	1849	1 28.52	—0 58.7	6 28 46.35	24 57 26.1	34
523	7.8	4 56 38.10	26 11 55.1	1 34.49	77.7	4 55 3.61	26 10 47.4	1850	1 32.59	+2 18.6	4 56 36.20	26 13 6.0	1
	8.9	5 17 49.11	26 26 12.9	1 34.78	54.7	5 16 14.33	26 25 18.2	1850	1 33.07	+1 33.5	5 17 47.40	26 26 51.7	4
	9	6 18 4.80	25 28 18.9	1 35.02	19.1	6 16 29.78	25 27 59.8	1849	1 28.92	—0 36.2	6 17 58.70	25 27 23.6	23
	8	6 19 30.61	25 43 30.6	1 35.08	18.0	6 17 55.53	25 43 12.6	1849	1 29.09	0 39.2	6 19 24.62	25 42 33.4	25
	9	6 21 8.80	25 15 26.6	1 34.97	17.4	6 19 33.83	25 15 9.2	1849	1 28.76	0 42.6	6 21 2.59	25 14 26.6	26
	9	6 21 42.26	+25 32 16.0	—1 35.05	—16.8	6 20 7.21	+25 31 59.2	1849	+1 28.95	—0 43.8	6 21 36.16	+25 31 15.4	28

NOTES TO COMPARISON-STARS FROM BESSEL'S ZONES.

For Nº. 1, the δ as given in zone 396 has been rejected, and only that of zone 523 been retained.

For N°· 3, the observation of zone 405 has been employed, although the right-ascensions differ by 16s· The error seems not improbable, and has been assumed.

For N°· 22, the scale reading has been assumed as 1049, instead of 1089, making the observed apparent δ +25° 36′ 9″.8 ; and for 1849, the mean δ +25° 35′ 25″.8.

For N°· 45, there is evidently a mistake of one division (=3′) in the observation, making the declination observed by Bessel +24° 13′ 21″.6.

For N°· 95, zone 278, the scale-reading has been assumed as 990, instead of 1010, making the observed apparent δ +22° 9′ 8″.7, and for 1852 the mean δ +22° 2′ 30″.6.

For N°· 97, the δ of zone 275 has been retained, and that of zone 278 rejected.

The Argelander Zones, that copious fountain of accurate positions of stars which are to be met with in no other catalogue, furnish forty-one places of southern stars; the original observations of which, together with their reductions, here follow:

Comparison-Stars from Argelander's Zones.

Ref. No.	Zone and No.	Observed		Reduction to 1850.0.		Mean place, 1850.0.		Year of Comp.	Reduction to beginning of year.		Mean place.	
		α.	δ.	in α.	in δ.	α.	δ.		in α.	in δ.	α.	δ.
		h. m. s.	° ′ ″	s.	″	h. m. s.	° ′ ″				h. m. s.	° ′ ″
111	212, 71	16 43 27.51	—26 39 18.8	—31.38	—10.7	16 42 56.13	—26 39 29.5	1850	. .	. .	16 42 56.13	—26 39 29.5
115	85	16 55 13.48	26 59 20.4	31.37	—19.4	16 54 42.11	26 59 39.8	1850	. .	. .	16 54 41.98	26 59 41.4
112	214, 54	16 49 44.00	26 52 42.2	32.44	+24.6	16 49 11.56	26 52 17.6	1850	. .	. .	16 49 11.81	26 52 19.3
113	56	16 50 37.43	26 56 57.6	32.44	22.8	16 50 4.99	26 56 34.8	1850	. .	. .	16 50 4.99	26 56 35.3
115	63	16 55 14.48	27 0 6.1	32.44	22.1	16 54 42.04	26 59 44.0	1850				
117	76	17 7 40.30	27 23 25.5	32.43	14.2	17 7 7.87	27 23 11.3	1850	. .	. .	17 7 7.73	27 23 9.6
120	84	17 13 54.82	27 31 35.8	32.43	+11.5	17 33 22.39	27 31 24.3	1850	. .	. .	17 13 22.27	27 31 24.2
136	217, 81	18 4 40.26	25 11 6.4	33.06	+10.6	18 4 7.20	25 10 55.8	1850	. .	. .	18 4 7.37	25 10 54.0
127	218, 11	17 39 14.00	18 2 40.0	33.12	— 1.5	17 38 40.88	18 2 41.5	1851	+3.50	—1.86	17 38 44.48	18 2 45.2
129	19	17 46 52.25	18 15 24.5	33.12	2.8	17 46 19.13	18 15 27.3	1851	3.51	—1.19	17 46 22.58	18 15 29.1
141	58	18 9 35.09	18 50 44.7	33.11	6.2	18 9 1.98	18 50 50.9	1851	3.53	+0.80	18 9 5.49	18 50 49.6
148	81	18 24 12.60	19 4 16.5	33.10	— 7.3	18 23 39.50	19 4 23.8	1851	+3.53	+2.07	18 23 42.99	19 4 24.0
141	219, 49	18 9 35.29	18 50 56.4	33.30	+ 3.9	18 9 1.99	18 50 52.5	1851	+3.53	+0.80		
136	220, 96	18 4 40...	25 10 33.3	. .	—19.4	. . . .	25 10 52.7	1850				
133	223, 38	17 56 28.00	27 50 21.5	33.84	+ 9.7	17 55 54.16	27 50 11.9	1850	. .	. .	17 55 54.16	27 50 11.9
135	46	18 0 24.37	27 45 13.4	33.85	+11.7	17 59 50.52	27 45 1.7	1850	. .	. .	17 59 50.52	27 45 1.7
141	227, 27	18 9 35.50	18 50 50.6	33.69	+ 0.9	18 9 1.81	18 50 49.7	1851	+3.53	+0.80		
148	52	18 24 13.24	19 4 26.2	33.73	— 1.1	18 23 39.51	19 4 27.3	1851	+3.53	+2.07		
123	300, 111	17 21 54.60	17 41 7.3	40.52	— 0.2	17 21 14.08	17 41 7.5	1851	+3.49	—3.37	17 21 17.73	17 41 12.1
112	304, 88	16 49 51.32	26 52 0.2	39.37	—19.9	16 49 11.95	26 52 20.1	1850				
113	90	16 50 44.50	26 56 15.6	39.37	—21.5	16 50 5.13	26 56 37.1	1850				
136	306, 91	18 4 48.50	25 11 6.2	40.96	+12.6	18 4 7.54	25 10 53.6	1850				
138	95	18 7 21.45	25 45 7.1	41.00	+ 3.0	18 6 40.45	25 45 4.1	1850	. .	. .	18 6 40.46	25 45 4.0
138	308, 27	18 7 24.16	25 45 6.4	43.68	+ 2.6	18 6 40.48	25 45 3.8	1850				
146	43	18 16 2.88	26 33 38.6	43.71	—12.6	18 15 19.17	26 33 51.2	1850	. .	. .	18 15 19.17	26 33 51.2
147	47	18 19 6.58	26 42 43.1	—43.72	—15.7	18 18 22.86	26 42 58.8	1850	. .	. .	18 18 22.86	26 42 58.8
112	388, 81	16 48 38.80	26 52 51.0	+33.12	+30.8	16 49 11.92	26 52 20.2	1850				
113	83	16 49 31.73	26 57 3.5	33.11	29.4	16 50 4.84	26 56 34.1	1850				
114	85	16 51 26.00	27 1 44.6	33.11	27.4	16 51 59.11	27 1 17.2	1850				
115	90	16 54 8.70	27 0 8.0	33.10	27.6	16 54 41.80	26 59 40.4	1850				
116	99	16 59 11.10	27 12 11.2	33.08	22.8	16 59 44.18	27 11 48.4	1850				
117	106–7	17 6 34.54	27 23 25.8	33.05	+17.8	17 7 7.59	27 23 8.0	1850				
120	115	17 12 49.10	27 31 37.9	33.04	+13.8	17 33 22.14	27 31 24.1	1850				
118	391, 37	17 10 37.52	17 35 50.7	32.38	+14.0	17 11 9.90	17 35 36.7	1851	+3.49	—4.24	17 11 13.39	17 35 40.9
123	54	17 20 42.05	17 41 22.1	32.35	12.2	17 21 14.40	17 41 9.9	1851	3.49	3.37		
126	70	17 31 25.48	17 59 58.5	32.32	8.5	17 31 57.80	17 59 50.0	1851	3.50	2.44	17 32 1.30	17 59 52.4
127	81	17 38 8.64	18 2 52.5	32.30	7.4	17 38 40.94	18 2 45.2	1851	3.50	1.86		
129	93	17 45 46.72	18 15 33.3	32.28	+ 4.8	17 46 19.00	18 15 28.5	1851	3.51	—1.19		
141	136	18 8.29.80	18 50 45.9	32.25	— 2.6	18 9 2.05	18 50 48.4	1851	3.53	+0.80		
148	172	18 23 7.12	—19 4 20.9	+32.24	— 6.1	18 23 39.36	—19 4 27.0	1851	+3.53	+2.07		

The Greenwich Twelve-Year Catalogue gives us eight stars, and its welcome supplement, the Greenwich Catalogue for 1850.0, thirty-five more. The last mentioned addition was received after the preparation of a catalogue for final adoption, but the new material was too important to be lost, and the computations were, therefore, recommenced from the point at which these places could be incorporated. The comparison-star used at Greenwich on the 8th December, 1849, is, however, unfortunately not in this catalogue, and a trustworthy place can nowhere be found. Five of the stars in the two lists are identical, but the materials afforded by each catalogue are separately given for the sake of greater convenience.

Comparison-Stars from the Twelve-Year Catalogue.

No. T. Y. Cat.	Name.	Mag.	Mean year.	α 1840.0.	No. of obs.	N. P. D. 1840.0.	No. of obs.	Yr. of comp.	Mean place for beginning of year.				No.
									α.	Ann. Pr.	δ.	Ann. Pr.	
				h. m. s.		° ′ ″			h. m. s.	s.	° ′ ″	″	
478	125 Tauri	6	1845	5 29 49.53	4	64 11 59.14	7	1849	5 30 22.94	+3.712	+25 48 24.21	+ 2.58	e
515	139 Tauri	5.6	1841,4	5 48 4.12	3	64 4 22.82	5	1849	5 48 37.60	3.720	25 55 46.09	+ 0.99	12
587	ε Geminorum . .	3.4	1841,3	6 34 5.14	22	64 43 2.52	19	1849	6 34 38.40	3.695	25 16 30.48	− 3.03	35
698	82 Geminorum . .	7	1841	7 38 59.03	3	66 28 9.73	7	1852	7 39 42.21	3.598	23 30 9.18	8.44	i
709	1 Cancri	6	1845	7 47 54.05	6	73 47 17.71	5	1852	7 48 35.04	3.416	16 10 52.80	9.14	51
745	λ Cancri	6	1838,5	8 11 0.68	12	65 28 45.97	17	1852	8 11 43.68	3.582	24 29 3.58	10.89	64
775	43γ Cancri	4.5	1843	8 34 0.99	9	67 57 39.70	8	1852	8 34 42.91	3.493	21 59 50.10	12.53	q
789	. . . .	. .	1838	8 48 12.76	5	68 2 20.92	6	1852	8 48 54.40	3.469	21 54 57.68	13.47	93
795	Lalande 17690 .	8	1838	8 49 43.95	5	68 13 3.33	6	1852	8 50 25.52	3.463	21 44 14.07	13.57	94
809	. . . .	. .	1838	9 3 35.27	5	68 40 14.22	6	1852	9 4 16.47	3.432	+21 16 52.62	−14.44	101
1467	Piazzi XVII 43 .	6½	1846	17 10 34.69	5	107 34 58.66	4	1851	17 11 13.03	+3.485	−17 35 44.55	− 4.24	118

Comparison-Stars from the Greenwich Catalogue for 1850.0.

No. Gr. Cat.	Name.	Mag	Mean year.	α.	No. of obs.	N. P. D.	No. of obs.	Yr. of comp	Mean place for beginning of year.				No.
									α.	Ann. Pr.	δ.	Ann. Pr.	
				h. m. s.		° ′ ″			h. m. s.	s.	° ′ ″	″	
335	Piazzi IV 287 . .	7	1851.2	4 56 36.57	2	63 46 53.37	1	1850	4 56 36.56	+3.704	+26 13 6.8	+ 5.48	1
350	. . . .	. .	1852.7	5 3 4.66	5	63 43 41.37	5	1850	5 3 4.64	3.711	26 16 19.8	4.93	2
361	. . . .	. .	1852.8	5 10 29.36	3	63 54 11.81	3	1850	5 10 29.37	3.711	26 5 49.1	4.30	3
363	Piazzi V 41 . .	6.7	1852.7	5 11 34.43	3	62 12 1.30	3	1850	5 11 34.43	3.760	27 47 58.7	4.21	*a*
376	. . . .	. .	1850.5	5 17 47.94	4	63 33 4.66	4	1850	5 17 47.93	3.725	26 26 55.4	3.67	4
381	118 Tauri	6	1852.1	5 20 2.54	1	64 58 37.10	1	1850	5 20 2.54	3.685	25 1 22.9	3.48	*c*
383	. . . .	. .	1852.6	5 21 43.28	2	63 32 14.31	2	1850	5 21 43.27	3.728	26 27 45.9	3.33	5
395	Piazzi V 145 . .	7	1853.1	5 27 46.91	2	63 10 29.27	2	1850	5 27 46.91	3.740	26 49 30.7	2.81	*d*
401	. . . .	. .	1852.1	5 29 36.64	3	63 28 30.22	4	1849	5 29 32.90	3.733	26 31 27.3	2.65	8
402	125 Tauri	6	1851.1	5 30 26.55	7	64 11 32.83	3	1849	5 30 22.84	3.712	25 48 24.6	2.58	*e*
406	Lalande 10669 . .	9	1852.9	5 32 16.17	6	63 28 5.60	6	1849	5 32 12.53	3.734	26 31 51.5	2.42	9
422	Lalande 11108 . .	8½	1851.2	5 44 38.56	1	63 36 57.33	1	1849	5 44 34.81	3.733	26 23 1.5	1.34	10
426	. . . .	. .	1852.3	5 46 18.57	5	63 33 13.07	5	1849	5 46 14.82	3.735	26 26 45.9	1.20	11
433	139 Tauri	5.6	1852.8	5 48 41.30	3	64 4 12.63	3	1849	5 48 37.56	3.720	25 55 46.6	0.99	12
438	Rümker 1673 . .	. .	1852.1	5 54 7.62	6	63 43 31.39	6	1849	5 54 3.94	3.731	26 16 30.6	0.51	13
439	Rümker 1680 . .	8	1851.4	5 54 32.20	2	63 39 1.83	3	1849	5 54 28.46	3.733	26 20 57.9	0.48	14
440	Piazzi V 306 . .	7	1851.1	5 54 55.74	2	64 33 22.34	2	1850	5 54 55.74	3.707	25 26 37.7	+ 0.44	*f*
451	Lalande 11684 . .	8	1852.1	6 1 34.30	6	63 57 44.01	6	1849	6 1 30.57	3.724	26 2 16.1	— 0.14	15
452	5 Geminorum . .	6	1851.1	6 2 20.35	4	65 33 8.48	3	1849	6 2 16.67	3.678	24 26 51.7	0.21	*g*
453	Lalande 11714 . .	9	1852.1	6 2 26.04	3	63 59 18.68	4	1849	6 2 22.31	3.724	26 0 41.7	0.21	16
457	Lalande 11854 . .	8	1852.8	6 6 8.93	5	64 37 37.57	5	1849	6 6 5.22	3.705	25 22 23.1	0.54	17
458	Lalande 11946 . .	9½	1853.2	6 7 38.84	4	64 27 38.08	4	1849	6 7 35.12	3.709	25 32 22.8	0.67	18
459	Lalande . {11976 / 11978} .	9	1852.7	6 9 29.88	2	64 24 58.45	2	1849	6 9 26.16	3.711	25 35 2.6	0.83	19
467	. . . .	. .	1852.2	6 11 35.54	4	64 14 15.44	3	1849	6 11 31.81	3.716	25 45 45.7	1.01	20
470	Piazzi VI 78 . .	7	1853.2	6 15 29.36	2	64 52 40.58	2	1849	6 15 25.65	3.696	25 7 20.9	1.35	21
473	Lalande 12237 . .	9	1851.6	6 16 50.62	4	64 24 37.41	2	1849	6 16 46.90	3.709	25 35 24.2	1.47	22
479	Lalande 12336 . .	8½	1851.2	6 19 27.55	1	64 17 31.33	1	1849	6 19 23.83	3.712	25 42 30.6	1.70	25
485	. . . .	. .	1852.7	6 21 5.98	2	64 45 35.04	2	1849	6 21 2.27	3.699	25 14 27.0	1.84	26
487	Lalande 12395 . .	9	1852.1	6 21 14.41	1	64 13 21.66	2	1849	6 21 10.68	3.714	25 46 40.8	1.86	27
488	. . . .	. .	1853.0	6 21 39.95	2	64 28 45.58	2	1849	6 21 36.24	3.706	25 31 16.5	1.89	28
490	Lalande 12554 . .	8	1851.2	6 25 47.97	1	64 58 6.48	1	1849	6 25 44.27	3.692	25 1 56.0	2.25	30
491	Lalande 12557 . .	9	1851.2	6 25 50.33	1	65 15 18.07	1	1849	6 25 46.64	3.684	24 44 44.4	2.26	31
495	. . . .	. .	1852.0	6 27 24.78	1	65 27 13.30	1	1849	6 27 21.09	3.677	24 32 49.3	2.39	32
496	. . . .	. .	1852.0	6 27 56.36	1	65 28 57.74	1	1849	6 27 52.67	3.676	24 31 4.9	2.44	33
505	27 Geminorum . .	3.4	1852.1	6 34 42.11	8	64 43 32.11	7	1849	6 34 38.37	3.695	25 16 32.0	3.03	35
573	82 Geminorum . .	7	1852.2	7 39 35.18	8	66 29 33.60	7	1852	7 39 42.38	3.598	23 30 9.5	8.44	*i*
578	84 Geminorum . .	6.7	1852.2	7 44 6.09	4	67 17 5.44	4	1852	7 44 13.24	3.574	22 42 37.0	8.80	*k*
589	Lalande 15707 . .	9	1852.2	7 55 8.26	3	65 4 30.02	3	1852	7 55 15.48	3.615	24 55 10.8	9.66	58
593	Bradley 1158 . .	7	1852.8	7 57 42.73	6	67 7 0.70	5	1852	7 57 49.85	3.562	22 52 39.6	9.85	*l*
608	λ Cancri	6	1852.2	8 11 36.67	7	65 30 34.61	7	1852	8 11 43.82	3.582	24 29 3.7	10.89	64
613	24υ^1 Cancri, pr. . . .	7	1852.2	8 17 43.98	4	64 58 37.71	4	1852	8 17 51.15	3.585	25 0 59.6	11.34	*m*
617	28υ^2 Cancri	6.7	1852.2	8 19 42.67	4	65 21 41.55	4	1852	8 19 49.82	3.573	24 37 55.5	11.48	*n*
619	30υ^3 Cancri	6	1852.2	8 22 37.83	3	65 25 2.12	2	1852	8 22 44.97	3.568	24 34 34.5	11.69	*o*
623	32υ^4 Cancri	6	1852.2	8 24 7.58	6	65 24 32.14	8	1852	8 24 14.71	3.565	24 35 4.3	11.80	*p*
631	43γ Cancri	4.5	1852.1	8 34 35.89	23	67 59 45.94	23	1852	8 34 42.88	3.493	21 59 49.0	12.53	*q*
640	Lalande 17513 . .	9	1852.9	8 45 20.93	6	67 7 55.17	6	1852	8 45 27.95	3.494	22 51 37.6	13.25	89
641	Lalande 17528 . .	7.8	1853.2	8 45 37.92	4	67 12 58.12	3	1852	8 45 44.90	3.492	22 46 35.3	13.27	*s*
645	. . . .	. .	1852.2	8 48 46.55	4	68 4 34.63	4	1852	8 48 54.48	3.469	21 54 58.2	13.47	93
659	Lalande 18105 . .	9	1852.2	9 3 12.64	3	68 57 44.97	3	1852	9 3 19.49	3.429	21 1 48.4	14.38	100
661	. . . .	. .	1852.2	9 4 9.58	5	68 42 40.21	5	1852	9 4 16.43	+3.432	+21 16 51.1	—14.44	101

For the stars from the *Histoire Céleste* of Lalande, the British reductions made and published under the superintendence of Mr. Baily have been employed, but with some endeavor towards critical scrutiny. The numbers of this catalogue are also here employed for reference. One zone, however, that of 1796, March 4, seemed to give places differing so much and so uniformly from other determinations of the same stars, as to render it advisable to reduce this anew, which was accordingly done. The tables of Hansen and Nissen were found to be computed with entire correctness, and the only possible source of discordance to be in the declinations of the fundamental stars selected from Piazzi, as the basis of the reduction. The stars chosen for determining the constants anew were these:

From Rümker's Catalogue, Nos. 2353, 2383, [2404,] 2477, 2503, 2504, 2533, 2558, 2785, 2799, 2840, 2896, 2920, 2955, 2972, 3004, 3012, [3013,] 3016, 3023, 3047, 3097.

From the Twelve-Year Catalogue, Nos. 769, 770, [775,] 802, 804, 809.

From Argelander's Catalogue, No. 207.

Those of the above mentioned stars whose numbers are inclosed in brackets proved to have been ill observed by Lalande, and were, consequently, excluded. The result indicates the need of a correction of — 2″.3 to the values given by the tables published by Prof. Schumacher, in his *Hülfstafeln*, and used for the preparation of Baily's edition of the *Histoire Céleste.* The average correction to Lalande's declinations for other zones at the same altitude is —3″.1, if Bessel be the standard.

Comparison-Stars from Lalande.

Page H. C.	No. Catalogue.	Mean place 1800.0.		Year of comparison.	Red. to year of comp.		Mean place for beginning of year.		No.
		α	δ.		in α.	in δ.	α.	δ.	
		h. m. s.	° ′ ″		m. s.	′ ″	h. m. s.	° ′ ″	
204	9531	4 53 31.37	+26 8 28.2	1850	+3 5.13	+4 40.4	4 56 36.50	+26 13 8.6	1
139, 143	9944, 5	5 8 26.50	27 44 27.3	1850	3 7.98	3 37.1	5 11 34.48	27 48 4.4	a
145, 204	10231-3	5 16 58.16	24 58 19.7	1850	3 4.23	3 0.6	5 20 2.39	25 1 20.2	c
143	10510	5 24 40.02	26 47 7.1	1850	3 7.02	2 27.3	5 27 47.04	26 49 34.4	d
145	10605	5 27 20.65	25 46 16.6	1849	3 1.79	2 13.1	5 30 22.42	25 48 29.7	e
145	10669	5 29 9.19	26 29 46.4	1849	3 2.92	2 5.4	5 32 12.11	26 31 51.8	9
310	11108	5 41 32.85	26 21 49.1	1849	3 2.91	1 12.5	5 44 35.76	26 23 1.6	10
145	11220	5 45 35.32	25 54 49.0	1849	3 2.29	0 55.3	5 48 37.61	25 55 44.3	12
310	11441	5 51 49.97	25 26 14.3	1850	3 5.38	+0 29.0	5 54 55.35	25 26 43.3	f
310	11684	5 58 28.22	26 2 16 8	1849	3 2.50	0 0.0	6 1 30.72	26 2 16.8	15
310	11714	5 59 19.70	26 0 45.7	1849	3 2.40	—0 3.6	6 2 22.10	26 0 42.1	16
310	11854	6 3 3.56	25 22 46.3	1849	3 1.47	0 19.6	6 6 5.03	25 22 26.7	17
145	11946	6 5 33.34	25 32 47.1	1849	3 1.72	0 26.0	6 7 35.06	25 32 21.1	18
145, 310	11976, 8	6 6 23.32	25 35 36.9	1849	3 1.78	0 33.9	6 9 25.10	25 35 3.0	19
145, 310	12197, 9	6 12 24.25	25 8 19.15	1849	3 1.10	0 59.6	6 15 25.35	25 7 19.5	21
145	12237	6 13 45.58	25 36 36.7	1849	3 1.75	1 5.4	6 16 47.33	25 35 31.2	22
145, 310	12336, 7	6 16 22.34	25 43 51.6	1849	3 1.82	1 16.6	6 19 24.16	25 42 35.0	25
145	12395	6 18 7.65	25 48 5.0	1849	3 1.96	1 24.1	6 21 9.61	25 46 40.9	27
145	12554	6 22 43.27	25 3 44.3	1849	3 0.87	1 43.7	6 25 44.14	25 2 0.6	30
145	12557	6 22 46.62	24 46 32.1	1849	3 0.47	1 43.9	6 25 47.09	24 44 48.2	31
145	12666	6 25 44.71	24 59 28.0	1849	3 0.73	1 56.6	6 28 45.41	24 57 31.4	34
316, 145	12880, 2	6 31 37.36	25 18 50.1	1849	3 1.07	2 21.6	6 34 38.43	25 16 28.5	35
51	14961	7 30 45.88	14 39 52.3	1852	2 56.38	6 48.5	7 33 42.26	14 33 3.8	42
51	15125	7 36 0.01	16 0 14.4	1852	2 57.80	7 10.4	7 38 57.81	15 53 4.0	44
214	15146	7 36 34.97	23 37 24.4	1852	3 7.30	7 13.2	7 39 42.27	23 30 11.3	i
214	15221	7 38 43.35	24 16 38.2	1852	3 8.04	7 22.0	7 41 51.39	24 9 16.2	45
211, 214, 273	15312-4	7 41 7.29	22 50 8.8	1852	3 6.02	7 31.8	7 44 13.31	22 42 37.0	k
51	15338	7 41 55.12	16 6 18.7	1852	2 57.71	7 34.8	7 44 52 83	15 58 43.9	46
214	15401	7 43 27.81	24 52 32.4	1852	3 8.53	7 41.5	7 46 36.34	24 44 50.9	47
214	15412	7 43 44.64	+24 44 27.1	1852	+3 8.34	—7 42.6	7 46 52.98	+24 36 44.5	48

Comparison-Stars from Lalande—Continued.

Page H. C.	No. Catalogue.	Mean place 1800.0.		Year of comparison.	Red. to year of comp.		Mean place for beginning of year.		No.
		α.	δ.		in α.	in δ.	α.	δ.	
		h. m. s.	° ′ ″		m. s.	′ ″	h. m. s.	° ′ ″	
51	15468	7 45 37.49	+16 18 50.2	1852	+2 57.80	−7 49.9	7 48 35.29	+16 11 0.3	51
214	15548	7 47 46.51	23 42 52.0	1852	3 6.76	7 58.9	7 50 53.27	23 34 53.1	53
214	15608	7 49 30.66	24 27 6.2	1852	3 7.60	8 6.0	7 52 38.26	24 19 0.2	55
146	15707	7 52 7.22	25 3 26.2	1852	3 8.21	8 16.5	7 55 15.43	24 55 9.7	58
214	15795	7 54 45.07	23 1 9.2	1852	3 5.44	8 26.8	7 57 50.51	22 52 42.4	l
52	16068	8 2 30.03	16 13 21.3	1852	2 56.97	8 57.1	8 5 27.00	16 4 24.2	61
211	16236	8 7 11.06	22 6 19.1	1852	3 3.47	9 15.4	8 10 14.53	21 57 3.7	63
214, 279, 286	16288-90, 91	8 8 37.28	24 38 24.2	1852	3 6.50	9 21.1	8 11 43.78	24 29 3.1	64
214	16447	8 13 2.11	24 34 48.5	1552	3 3.71	9 37.9	8 16 5.82	24 25 10.6	68
214	16464	8 13 30.16	24 11 12.9	1852	3 5.58	9 39.7	8 16 35.74	24 1 33.2	69
214, 286	16517-9	8 14 44.55	25 10 53.2	1852	3 6.69	9 44.4	8 17 51.24	25 1 8.8	m
211	16582	8 16 26.80	21 48 13.1	1852	3 2.54	9 50.6	8 19 29.34	21 38 22.5	70
214, 279, 286	16597-9	8 16 43.47	24 47 52.6	1852	3 6.06	9 51.8	8 19 49.53	24 38 0.8	n
211	16659	8 18 41.68	21 30 56.2	1852	3 2.05	9 59.0	8 21 43.73	21 20 57.2	74
214, 286	16685, 7	8 19 39.66	24 44 41.5	1852	3 5.74	10 2.8	8 22 45.41	24 34 38.6	o
286	16763	8 21 9.56	24 45 17.9	1852	3 5.65	10 8.3	8 24 15.21	24 35 9.6	p
211	17013	8 28 10.98	20 46 48.8	1852	3 0.57	10 19.3	8 31 11.55	20 36 14.5	81
148, 212, 214, 286	17143-6	8 31 42.25	22 10 43.0	1852	3 1.85	10 46.5	8 34 43.10	21 59 56.5	q
212	17513	8 42 26.06	23 3 5.5	1852	3 1.94	11 24.1	8 45 28.00	22 51 41.4	89
219, 254	17514, 5	8 42 27.50	20 42 48.8	1852	2 59.46	11 24.1	8 45 26.96	20 31 24.7	r
212, 214	17528, 9	8 42 43.55	22 58 14.6	1852	3 1.83	11 25.1	8 45 45.38	22 46 49.5	s
212	17690	8 47 25.60	21 56 1.9	1852	3 0.34	11 41.1	8 50 25.94	21 44 20.8	94
212	17937	8 55 17.38	21 18 46.5	1852	2 59.06	12 7.1	8 58 16.44	21 6 24.4	97
212	18105	9 0 20.78	21 14 15.1	1852	2 58.56	12 23.4	9 3 19.34	21 1 51.7	100
212	18132	9 1 7.87	+21 29 26.3	1852	2 58.74	12 25.9	9 4 16.61	21 17 0.4	101
567	30556	16 37 50.45	−26 22 44.7	1850	3 4.76	5 45.6	16 40 55.21	26 28 30.2	110
567	30874	16 48 53.77	26 56 14.1	1850	3 6.05	4 59.7	16 51 59.82	+27 1 13.8	114
343	31543	17 10 57.74	17 29 35.4	1851	2 57.71	3 30.8	17 13 55.45	−17 33 6.2	122
170, 343	31791, 2	17 18 19.76	17 38 14.2	1851	2 58.02	2 58.5	17 21 17.78	17 41 12.7	123
170, 343	31931, 2	17 22 20.04	17 40 52.8	1851	2 58.13	2 40.8	17 25 18.17	17 43 33.6	124
170	32426	17 35 45.58	18 1 4.6	1851	2 58.73	1 41.4	17 38 44.31	18 2 46.0	127
170	32706	17 43 23.78	18 14 20.0	1851	2 59.08	1 3.0	17 46 22.86	18 15 23.0	129
568	32727	17 44 4.68	28 1 2.9	1850	3 9.09	1 2.7	17 47 13.77	28 2 5.6	130
568	32974	17 50 19 04	27 48 36.8	1850	3 8.82	0 35.5	17 53 27.86	27 49 12.3	132
568	33214	17 56 41.42	27 44 48.0	1850	3 8.74	−0 7.6	17 59 50.16	27 44 55.6	135
566	33394	18 1 2.34	25 10 55.9	1850	3 5.00	+0 11.3	18 4 7.34	25 10 44.6	136
567, 568	33427-8	18 1 37.29	27 32 21.1	1850	3 8.42	0 14.0	18 4 45.71	27 32 7.1	137
171	33598	18 6 5.94	18 51 20.1	1851	2 59.91	0 33.9	18 9 5.85	18 50 46.2	141
171	33748	18 9 37.56	18 56 3.2	1851	2 59.99	0 49.6	18 12 37.55	18 55 13.6	144
567	33855	18 12 12.64	26 34 51.6	1850	3 6.95	1 0.2	18 15 19.59	26 33 51.4	146
567	33989	18 15 15.78	−26 44 13.9	1850	+3 7.14	+1 13.5	18 18 22.92	−26 43 0.4	147

For N°· 11946 the *a* is assumed to be 1*m*. less than recorded. This error was transferred to the Nautical Almanac, and to both series of the Cape Observations.

For N°· 18132 the *a* is assumed to be 10*s*. greater than recorded.

For N°· 17013 an error of 15″ in δ is assumed.

For N°· 17937 an error of 15″ in δ is assumed.

Other observations still may be found in the catalogues of Rümker, Piazzi and Taylor, the zones of Lamont and the observations of Mr. Maclear at the Cape of Good Hope. These are appended, as well as the manuscript observations of Professor Brünnow at Ann Arbor, already mentioned, and a small table containing such other observations as have been found of the comparison-stars which are identified and employed in these computations.

Comparison-Stars from Rümker.

No. Catalogue.	Mag.	α 1836.0.	No. of obs.	Ann. Prec.	δ 1836.0.	No. of obs.	Ann. Prec.	Year of com.	Reduction. in α.	Reduction. in δ.	Mean place for beginning of year. α.	Mean place for beginning of year. δ.	No.
		h. m. s.		s.	° ′ ″		″		s.	′ ″	h. m. s.	° ′ ″	
1499	6	5 29 34.37	2	+3.708	+25 47 50.36	2	+2.44	1849	+48.24	+0 34.1	5 30 22.61	+ 25 48 24.5	e
1673	. .	5 53 15.21	1	3.727	26 16 24.24	1	0.59	1849	48.50	7.2	5 54 3.71	26 16 31.5	13
1680	8	5 53 39.52	2	3.728	26 20 53.52	1	0.55	1849	48.57	6.8	5 54 28.09	26 21 0.3	14
1685	. .	5 54 3.59	16	3.704	25 26 36.23	10	+0.49	1850	51.89	+ 6.8	5 54 55.48	25 26 43.0	f
1737	6	6 0 42.10	5	3.722	26 2 16.88	5	—0.10	1849	48.42	— 1.2	6 41 30.52	26 2 15.7	15
1744	7	6 1 28.33	1	3.675	24 27 2.01	1	0.15	1849	47.82	2.1	6 2 16.15	24 26 59.9	g
1783	. .	6 6 47.04	1	3.701	25 22 23.99	1	0.59	1849	48.23	8.1	6 7 35.27	25 32 15.8	18
1979	3	6 33 50.37	16	3.691	25 17 9.11	13	2.95	1849	47.95	0 38.8	6 34 38.31	25 16 30.3	35
2335	6	7 47 40.39	3	3.414	16 13 19.63	2	9.07	1852	54.69	2 25.8	7 48 35.08	16 10 53.8	51
2372	. .	7 52 37.01	1	3.406	16 0 34.13	1	9.46	1852	54.54	2 32.0	7 53 31.56	15 58 2.1	56
2476	6	8 10 46.32	3	3.581	24 31 56.65	3	10.82	1852	57.34	2 53.9	8 11 43.66	24 29 2.7	64
2516	7.8	8 16 54.07	2	3.585	25 4 4.29	2	11.31	1852	57.36	3 1.0	8 17 51.43	25 1 3.3	m
2545	. .	8 21 47.79	1	3.566	24 37 43.39	1	11.67	1852	57.06	3 6.7	8 22 44.85	24 34 36.7	o
Nachtr. VIII, 13	. .	8 23 30.76	1	3.374	15 49 30.15	1	11.75	1852	54.05	3 8.6	8 24 24.81	15 46 21.6	75
Nachtr. VIII, 19	8	8 30 16.00	1	3.467	20 39 28.60	1	12.22	1852	55.52	3 16.2	8 31 11.52	20 36 12.4	81
2613	. .	8 31 30.14	1	3.427	18 49 33.55	1	12.30	1852	54.88	3 17.5	8 32 25.02	18 46 16.0	83
2624	4.5	8 33 46.88	6	3.492	22 3 9.20	5	12.47	1852	55.87	3 19.6	8 34 42.75	21 59 49.6	q
2799	. .	9 6 45.58	1	3.415	20 45 2.14	1	14.58	1851	51.27	3 39.3	9 7 36.85	20 41 22.8	104
2800	. .	9 6 48.13	1	3.411	20 31 41.58	1	14.58	1851	51.16	3 39.4	9 7 39 29	20 28 2.2	105
2830	7	9 11 23.40	3	+3.391	+19 46 47.71	3	—14.86	1851	+50.90	—3 43.4	9 12 14.30	+ 19 43 4.3	109

In N°· 1783 the δ is assumed to be 25° 32′, instead of 25° 22′.

Comparison-Stars from Piazzi.

No. Catalogue.	Mean place, 1800.0. α.	Mean place, 1800.0. δ.	Year of comparison.	Red. to year of comparison. in α.	Red. to year of comparison. in δ.	Mean place for beginning of year. α.	Mean place for beginning of year. δ.	No.
	h. m. s.	° ′ ″		m. s.	′ ″	h. m. s.	° ′ ″	
IV, 287	4 53 31.70	+ 26 8 28.2	1850	+ 3 5.13	+ 4 40.4	4 56 36.83	+ 26 13 8.6	1
V, 41	5 8 26.56	27 44 25.5	1850	3 7.98	3 37.1	5 11 34.54	27 48 2.6	a
98	5 16 58.36	24 58 25.0	1850	3 4.23	3 0.6	5 20 2.59	25 1 25.6	c
145	5 24 39.67	26 47 4.9	1850	3 7.02	2 27.3	5 27 46.69	26 49 32.2	d
165	5 27 20.50	25 46 14.8	1849	3 1.79	2 13.1	5 30 22.29	25 48 27.9	e
273	5 45 35.16	25 54 51.5	1849	3 2.29	0 55.3	5 48 37.45	25 55 46.8	12
306	5 51 50.07	25 26 12.8	1850	3 5.38	+ 0 29.0	5 54 55.45	25 26 41.8	f
350	5 59 16.24	24 26 59.5	1849	3 0.21	— 0 3.3	6 2 16.45	24 26 56.2	g
VII, 207	7 36 34.78	23 37 23.6	1852	3 7.30	7 13.2	7 39 42.08	23 30 10.5	i
232	7 41 7.40	22 50 14.3	1852	3 6.02	7 31.8	7 44 13.42	22 42 42.5	k
299	7 54 45.00	23 1 10.0	1852	3 5.44	8 26.8	7 57 50.44	22 52 43.2	l
VIII, 41	8 8 37.18	24 38 26.7	1852	3 6.50	9 21.1	8 11 43.68	24 29 5.6	64
65	8 14 44.80	25 10 49.0	1852	3 6.69	9 44.4	8 17 51.49	25 1 4.6	m
76	8 16 43 67	24 47 51.4	1852	3 6.06	9 51.8	8 19 49.73	24 37 59.6	n
84	8 19 39.50	24 44 42.0	1852	3 5.74	10 2.8	8 22 45.25	24 34 39.2	o
89	8 21 9.34	24 45 14.5	1852	3 5.65	10 8.3	8 24 14.99	24 35 6.2	p
121	8 28 10.52	20 46 49.5	1852	3 0.57	10 33.8	8 31 11.09	20 36 15.7	81
142	8 31 41.30	22 10 39.0	1852	3 1.85	10 46.5	8 34 43.15	21 59 52.5	q
195	8 42 27.90	20 42 49.2	1852	2 59.46	11 24.1	8 45 27.36	20 31 25.1	r
IX, 50	9 9 21.00	+ 19 55 43.3	1851	2 53.18	12 36.6	9 12 14.18	+ 19 43 6.7	109
XVII, 43	17 8 15.47	— 17 31 58.5	1851	2 57.71	3 42.5	17 11 13.18	— 17 35 41.0	118
63	17 10 57.47	17 29 37.7	1851	2 57.71	3 30.8	17 13 55.18	17 33 8.5	122
221	17 35 45.50	18 1 1.5	1851	2 58.73	— 1 41.4	17 38 44.23	18 2 42.9	127
XVIII, 24	18 5 32.10	27 5 58.0	1850	3 7.76	+ 0 31.1	18 8 39.86	27 5 26.9	140
41	18 9 53.82	26 29 38.0	1850	3 6.84	0 50.1	18 13 0.66	26 28 47.9	145
95	18 20 42.87	— 19 6 2.2	1851	+ 3 0.12	+ 1 39.0	18 23 42.99	— 19 4 23.2	148

Comparison-Stars fro Taylor.

No. Catalogue.	Mean place, 1835.		Year of comparison.	Red. to year of comparison.		Mean place for beginning of year.		No.
	a.	*δ.*		in *a.*	in *δ.*	*a.*	*δ.*	
	h. m. s.	° ′ ″		m. s.	′ ″	h. m. s.	° ′ ″	
1808	4 55 41.12	+ 26 11 44.4	1850	+ 0 55.57	+ 1 22.6	4 56 36.69	+ 26 13 7.0	1
1912	5 10 38.11	27 46 55.3	1850	0 56.39	1 3.7	5 11 34.50	27 47 59.0	*a*
1988	5 19 7.20	25 0 32.6	1850	0 55.27	0 52.8	5 20 2.47	25 1 25.4	*c*
2045	5 26 50.77	26 48 47.6	1850	0 56.09	0 42.8	5 27 46.86	26 49 30.4	*d*
2071	5 29 30.83	25 47 46.5	1849	0 51.96	0 36.7	5 30 22.79	25 48 23.2	*e*
2220	5 47 45.58	25 55 31.0	1849	0 52.09	0 14.4	5 48 37.67	25 55 45.5	12
2266	5 54 0.29	25 26 31.6	1850	0 55.60	+ 0 7.3	5 54 55.89	25 26 38.9	*f*
2335	6 1 25.01	24 26 55.7	1849	0 51.50	— 0 2.3	6 2 16.51	24 26 53.4	*g*
2456	6 14 33.87	25 7 39.6	1849	0 51.77	0 18.3	6 15 25.64	25 7 21.2	21
2632	6 33 46.70	25 17 12.0	1849	0 51.76	0 41.7	6 34 38.46	25 16 30.3	35
3222	7 38 41.28	23 32 35.3	1852	1 1.22	2 23.0	7 39 42.50	23 30 12.3	*i*
3272	7 43 12.73	22 45 13.0	1852	1 0.79	2 29.1	7 44 13.52	22 42 43.9	*k*
3306	7 47 37.08	16 13 28.4	1852	0 58.11	2 34.8	7 48 35.19	16 10 53.6	51
3402	7 56 48.99	22 55 27 0	1852	1 0.60	2 47.0	7 57 49.59	22 52 40.0	*l*
3519	8 10 42.92	24 32 11.5	1852	1 0.93	3 4.7	8 11 43.85	24 29 6.8	64
3575	8 16 50.33	25 4 13.2	1852	1 1.00	3 12.4	8 17 51.33	25 1 0.8	*m*
3594	8 18 49.30	24 41 14.0	1852	1 0.79	3 14.8	8 19 50.09	24 37 59.2	*n*
3617	8 21 44.61	24 37 53.7	1852	1 0.71	3 18.4	8 22 45.32	24 34 35.3	*o*
3635	8 23 14.19	24 38 25.7	1852	1 0.66	3 20.1	8 24 14.85	24 35 5.6	*p*
3739	8 33 43.65	22 3 22.4	1852	0 59.41	3 32.6	8 34 43.06	21 59 49.8	*q*
3861	8 44 28.47	20 35 9.2	1852	0 58.63	3 44.8	8 45 27.10	20 31 24.4	*r*
4088	9 11 20.31	+ 19 47 4.7	1851	0 54.30	3 58.2	9 12 14.61	+ 19 43 6.5	109
8004	17 10 17.56	— 17 34 33.5	1851	0 55.78	1 8.5	17 11 13.34	— 17 35 42.0	118
8219	17 37 48.29	18 2 14.7	1851	0 56.08	— 0 30.4	17 38 44.37	18 2 45.1	127
8437	18 7 43.67	27 5 39.7	1850	0 56.33	+ 0 10.7	18 8 40.00	27 5 29.0	140
8458	18 12 4.92	26 29 6.9	1850	0 56.06	0 16.5	18 13 0.98	26 28 50.4	145
8533	18 22 46.65	— 19 4 57.2	1851	0 56.51	+ 0 32.5	18 23 43.16	— 19 4 24.6	148

Comparison-Stars from Lamont.

Page Catalogue. Vol. VII.	Mean place, 1830.0		Year of comparison.	Red. to year of comparison.		Mean place for beginning of year.		No.
	a.	*δ.*		in *a.*	in *δ.*	*a.*	*δ.*	
	h. m. s.	° ′ ″		m. s.	″	h. m. s.	° ′ ″	
125	17 27 29.92	— 27 56 2.9	1850	+ 1 15.48	— 55.61	17 28 45.40	— 27 56 58.5	125
126	17 52 11.94	27 49	1850	1 15.54	. . . .	17 53 27.48	27 49	132
127	18 3 30.24	27 32	1850	1 15.70	. . . .	18 4 45.94	27 32	137
127	18 10 39 09	26 9 2.5	1850	1 14.55	+ 19.27	18 11 53.64	26 8 43.2	143
127	18 11 22.64	18 55 40.5	1851	1 14.12	22.10	18 12 36.76	18 55 18.4	144
128	18 17 7.91	— 26 24 31.1	1850	+ 1 14.84	+ 31.05	18 18 22.75	— 26 43 0.0	147

The declination of the last of these stars is given in the Munich Zones as —26° 24′; but the agreement of the place with that of our star, N°. 147, is so complete in all other respects, that I have had no hesitation in assuming the minutes as 43, instead of 24, as printed. The declination will then accord with Argelander's to 1″.2, and with the mean between Argelander and Washington to 0″.8, although differing from that of the B. A. Catalogue by 9″.5. The right-ascensions agree.

Comparison-Stars determined at Cape of Good Hope during the first series of Mars-observations.

No.	Date.	Observed α.	Observed δ.	Red. to 1849.0. in α.	Red. to 1849.0. in δ.	Reduced α.	Reduced δ.	Mean places, 1849.0. α.	Mean places, 1849.0. δ.
		h. m. s.	° ′ ″	s.	″	h. m. s.	° ′ ″	h. m. s.	° ′ ″
35	1849. Nov. 18	6 34 42.03	+ 25 16 16.71	− 3 58	+11.49	6 34 38.45	+25 16 28.20		
	19	42.02	18.25	3.61	11.51	38.41	29.76		
	21	. . . .	16.94	. . .	11.56	. . . .	28.50		
	24	42.17	. . . . .	3.67	. . .	38.50	. . . . .	6 34 38.45	+25 16 28.82
21	Nov. 21	6 15 29.47	25 7 10.27	− 3.75	+ 9.86	6 15 25.72	25 7 20.13		
	24	29.42	. . . . .	3.83	. . .	25.59			
	30	29.65	9.13	3.96	9.95	25.69	19.08		
	Dec. 1	. . . .	9.83	. . .	9.96	. . . .	19.79		
	2	29.51	12.09	4.01	9.96	25.50	22.05		
	3	. . . .	11.93	. . .	9.97	. . . .	21.90	6 15 25.62	25 7 20.59
25	Nov. 27	6 19 28.16	25 42 23.61	− 3.90	+10.40	6 19 24.26	25 42 34.01		
	28	28.43	23.62	3.92	10.41	24.51	34.03		
	29	. . . .	24.92	. . .	10.41	. . . .	35.33		
	30	28.80	. . . . .	3.97	. . .	24.83	. . . . .	6 19 24.53	25 42 34.46
27	Dec. 2	6 21 14.50	25 47 19.15	− 4.00	+10.61	6 21 10.50	25 47 29.76		
	1850. Jan. 8	15.07	. . . . .	4.55	. . .	10.52	. . . . .	6 21 10.51	
15	1849. Dec. 4	. . . .	26 2 10.01	. . .	+ 8.72	. . . .	26 2 18.73		
	6	. . . .	8.47	. . .	8.71	. . . .	17.18		
	9	. . . .	9.12	. . .	8.67	. . . .	17.79	. . . .	26 2 17.90
12	Dec. 9	. . . .	25 55 40.61	. . .	+ 7.33	. . . .	25 55 47.94		
	10	. . . .	37.44	. . .	7.32	. . . .	44.76		
	11	5 48 42.81	38.57	− 4.28	7.31	5 48 38.53	45.88		
	1850. Jan. 10	42.28	. . . . .	4.62	. . .	37.66	. . . . .	5 48 38.09	25 55 46.19
10	1849. Dec. 11	. . . .	26 22 53.36	. . .	+ 6.87	. . . .	26 23 0.23		
	14	5 44 40.26	55.53	− 4.34	6.80	5 44 35.92	2.33		
	15	39.93	55.39	4.35	6.78	35.58	2.17		
	16	. . . .	57.18	. . .	6.76	. . . .	3.94		
	18	. . . .	55.12	. . .	6.73	. . . .	1.85	5 44 35.75	26 23 2.10
9	Dec. 20	. . . .	26 31 47.55	. . .	+ 5.29	. . . .	26 31 52.84		
	21	5 32 16.83	48.82	− 4.44	5.26	5 32 12.39	54.08		
	22	. . . .	47.66	. . .	5.23	. . . .	52.89		
	23	16.98	. . . . .	4.45	. . .	12.53			
	26	16.61	46.93	4.49	5.10	12.12	52.03		
	27	16.95	47.80	4.49	5.07	12.46	52.87		
	29	16.85	47.41	4.51	5.00	12.34	52.41		
	31	16.94	45.59	4.52	4.94	12.42	50.53		
	1850. Jan. 3	16.94	48.85	4.54	4.82	12.40	53.67	5 32 12.38	26 31 52.66
8	1849. Dec. 22	. . . .	26 31 22.95	. . .	+ 4.95	. . . .	26 31 27.90		
	23	. . . .	22.71	. . .	4.91	. . . .	27.62		
	24	. . . .	23.27	. . .	4.87	. . . .	28.14		
	27	. . . .	23.44	. . .	4.77	. . . .	28.21		
	29	. . . .	22.10	. . .	4.64	. . . .	26.74		
	31	. . . .	21.28	. . .	4.51	. . . .	25.79		
	1850. Jan. 3	. . . .	23.38	. . .	4.42	. . . .	27.80	. . . .	26 31 27.46
1	1850. Jan. 7	4 56 37.34	26 12 58.60	− 4.44	+ 0.54	4 56 32.90	26 12 59.14		
	8	37 31	13 0.24	4.44	0.51	32.87	13 0.75		
	9	37.47	0.61	4.43	0.48	33.04	1.09		
	10	37.38	1.67	4.43	0.45	32.95	2.12		
	12	37.45	1.44	4.42	0.39	33.03	1.83		
	14	37.51	1.09	4.41	0.34	33.10	1.43		
	15	37.59	1.21	4.41	0.32	33.18	1.53		
	16	37.36	0.77	4.40	0.29	32.96	1.06	4 56 33.00	26 13 1.12
17	1849. Dec. 21	6 6 9.71	. . . . .	− 4.38	. . .	6 6 5.33	. . . . .	6 6 5.33	
18	1850. Jan. 7	6 8 39.55	. . . . .	− 4.54	. . .	6 7 35.01			
	8	39.68	. . . . .	4.55	. . .	35.13	. . . . .	6 7 35.07	

For N°. 18, the right-ascension is assumed to be recorded one minute too large. See note to same star under Comparison-Stars from Lalande.
N°. 27, Wrong star observed with mural?

Comparison-Stars determined at Cape of Good Hope during the second series of Mars observations.

No.	Date.	Observed δ.	Red. to 1852.0.	Mean δ 1852.0.	No.	Date.	Observed δ.	Red. to 1852.0.	Mean δ 1852.0.
	1852.	° ′ ″	″	° ′ ″		1852.	° ′ ″	″	° ′ ″
101	Jan. 3	+21 16 49.48	+3.53	+21 16 53.01	64	Feb. 13	+24 29 1.13	+4.35	+24 29 5.48
64	Jan. 19	24 29 1.46	+3.92	24 29 5.38		14	1.45	4.35	5.80
	20	29 1.03	3.94	4.97		16	2.92	4.33	7.25
	21	28 58.73	4.00			17	2.36	4.32	6.68
	22	29 0.86	4.04	4.90		18	0.93	4.31	5.24
	23	0.80	4.07	4.87		19	3.41	4.30	
	24	1.48	4.10	5.58		20	3.20	4.29	
	26	0.92	4.16	5.08		23	3.94	4.24	
	27	1.54	4.19	5.73		24	4.22	4.22	———
	29	0.67	4.25	4.92					+24 29 5.75
	Feb. 2	1.85	4.30	6.15	58	Feb. 11	24 55 10.01	+2.94	
	3	1.53	4.32	5.85		12	8.83	2.89	24 55 11.72
	9	2.09	4.36	6.45		13	8.39	2.84	11.23
	10	2.30	4.36	6.66		14	8.38	2.78	11.16
	12	2.11	4.36	6.47		16	9.71	2.67	———
									+24 55 11.37

Comparison-Stars from Ann Arbor observations.

No.	Mean place 1856.0.		Year of comp.	Red. to year of comparison.		Mean place for beginning of year.	
	α.	δ.		in α.	in δ.	α.	δ.
	h. m. s.	° ′ ″		s.	″	h. m. s.	° ′ ″
112	16 49 37	−26 53 0.78	1850	−22.306	+36.468	16 49 15	−26 52 24.31
113	16 50 30	26 57 12.84	1850	22.322	36.030	16 50 8	26 56 36.81
119	17 13 17	27 51 20.28	1850	22.581	24.456	17 12 54	27 50 55.82
120	17 13 48	27 31 52.40	1850	22.526	24.186	17 13 25	27 31 28.21
121	17 14 17	27 49 30.38	1850	22.580	23.940	17 13 54	27 49 6.44
122	17 14 15	17 33 30.92	1851	17.437	19.965	17 13 58	17 33 10.96
125	17 29 11	27 57 16.54	1850	22.649	16.230	17 28 48	27 57 0.31
128	17 44 19	28 1 5.63	1850	22.685	8.322	17 43 56	28 0 57.31
132	17 53 53	27 49 17.89	1850	22.663	3.306	17 53 30	27 49 14.58
134	17 59 25	27 39 29.28	1850	22.635	+ 0.402	17 59 2	27 39 28.88
139	18 7 24	27 27 20.40	1850	22.597	− 3.786	18 7 1	27 27 24.19
143	18 12 15	−26 8 41.39	1850	−22.367	− 5.808	18 11 53	− 26 8 47.20

Comparison-Stars from various sources.

No.	Authority.	Epoch.	Obs'd α.	No. of obs.	Obs'd δ.	No. of obs.	Year of com.	Red. to year of comp.		Mean place for beg. of year.	
								in α.	in δ.	α.	δ.
			h. m. s.		° ′ ″			m. s.	′ ″	h. m. s.	° ′ ″
35	Brisbane	1825.0	6 33 8.25	3	+25 17 41.6	2	1849	+1 28.60	−1 10.9	6 34 36.85	+25 16 30.7
49	Struve Cat. Gen., 931	1830.0	7 45 45.86	4	+25 6 20.4	4	1852	+1 19.88	−3 17.7	7 47 5.74	+25 3 2.7
51	Wrottesley, Mem. R.A.S. XXIII, 27	1850.0	7 48 28.17	5	. . . .	.	1852	+ 6.83	. . .	7 48 35.00	. . . .
m	Struve Cat. Gen., 994	1830.0	8 16 32.45	6	+25 5 10.7	6	1852	+1 18.91	−4 10.0	8 17 51.36	+35 1 0.7
83	Hamburg, A. N. XLIII, 113 . .	1856.0	8 32 39.23	3	+18 45 25.3	3	1852	− 13.72	+ 49.5	8 32 25.51	+18 46 14.8
91	Königsberg, A. N., XIII, 83 . .	1833.0	8 46 19.89	13	+22 19 30.5	13	1852	+1 6.15	−4 13.6	8 47 26.04	+22 15 16.9
91	Dorpat, A. N. XIII, 243 . . .	1833.0	8 46 19.91	6	+22 19 34.1	5	1852	+1 6.15	−4 13.6	8 47 26.06	+22 15 20.5
92	Dorpat, A. N. XIII, 243 . . .	1833.0	8 46 26.32	2	+22 13 1.1	2	1852	+1 6.09	−4 13.4	8 47 32.41	+22 8 47.7
141	Altona, A. N. VII, 81	1828.0	18 7 44.40	2	−18 51 10.3	1	1851	+1 21.14	+0 17.1	18 9 5.54	−18 50 53.2
143	Wrottesley, Mem. R.A.S. XXIII, 39	1850.0	18 11 53 36	5	. . . .	.	1850	0.0	. . .	18 11 53.36	. . . .
144	Altona, A. N. VII, 81	1828.0	18 11 16.00	3	−18 55 43.04	2	1851	+1 21.16	+0 24.1	18 12 37.16	−18 55 19.0
147	Wrottesley, Mem. R.A.S. XXIII, 39	1850.0	18 18 22.50	5	. . . .	.	1850	0.0	. . .	18 18 22.50	. . . .

For the Dorpat observation of N°. 91 and the Altona observation of N°. 141, the declinations are so discrepant that they have not been incorporated into the final means. The latter, as published, gives the apparent place; which has been transformed in this table into the mean place for the beginning of the year.

The fewness of the observations from most of the individual sources renders the determination of the constant differences for the results of the respective observers a matter of much difficulty. And it was soon palpable that no trustworthy equation could be obtained for any observer, which would hold even approximately both for the southern stars of the first *Venus*-series and the northern stars of the three other series of observations. Nor did the several equations to be found in the books appear altogether satisfactory, or accordant.

The catalogue of Comparison-stars contains 148 stars, arranged and numbered in the order of their right-ascensions. Of these, N$^{os.}$ 1–35, inclusive, belong to the *first Mars-series*, and are all situated between $24\frac{1}{2}°$ and $26\frac{1}{2}°$ of north declination.

Twenty-three stars, between N$^{os.}$ 47–86, inclusive, as well as N$^{os.}$ 87–109, making 46 in all, belong to the *second Mars-series*, and are between the declinations $19\frac{1}{2}°$ and 25° north.

N$^{os.}$ 36–46, as well as seventeen stars between N$^{os.}$ 47–86, making thirty-nine in all, belong to the *second Venus-series*, and are situated between $14\frac{1}{2}°$ and 25° north declination. So that of all these 109 stars, none are farther north than $+26°.5$, and none farther south than $+14°.5$.

The *first Venus-series*, on the other hand, contains thirty-nine stars, N$^{os.}$ 110–148, all of which are between $17\frac{1}{2}°$ and 28° of south declination, and comprised therefore within the limits of Argelander's southern zones.

Of the special lists, the Santiago determinations comprise the whole list of stars compared with *Mars* during the second series of observations.

The Washington determinations comprise the whole list of southern stars, with one exception, (*Venus*, I,) and 25 northern ones—8 for *Mars* I, 17 for *Mars* II.

The Cape determinations are for 12 stars observed with *Mars* I, and 3 observed with *Mars* II.

The places from Bessel's zones are, of course, exclusively for northern, and those from Argelander's exclusively for southern stars.

The twenty stars from Rümker's catalogue are all northern. Those from the third Greenwich catalogue, and all but one from the Twelve-Year, are northern.

The stars from Lamont and Brünnow are all southern.

From the positions taken from Lalande, 57 are for northern and 14 for southern stars.

Of those from Piazzi, 20 are northern and 6 are southern stars. Of those from Taylor, 22 are northern and 5 are southern.

Under these circumstances, it is manifestly most appropriate to refer the northern stars to Bessel as the standard observer, and the southern to Argelander ; and this has been done, for the sake of avoiding as much uncertainty as possible. In order to deduce the corrections necessary for reducing the declinations to the standard, all those stars which have been determined by two different authorities have been made to contribute to the result, and the mean difference for each two observers computed when possible.

Thus, we have for the Santiago (northern) determinations by 31 observations,

$$\text{Santiago—Bessel} = +\,0''.56 \pm 0''.38,$$

and by 17 observations,

$$\text{Washington—Santiago} = +\,1''.06 \pm 0''.23,$$

one observation being rejected in the latter case by Peirce's Criterion.

The Greenwich catalogue of positions for 1850 gives by 23 observations,

$$\text{Bessel—Greenwich} = +\,0''.562 \pm 0''.503,$$

and by 8 observations,

$$\text{Washington—Greenwich} = +\,0''.66 \pm 0''.36.$$

Furthermore, we have from 20 observations (the same one being rejected as before,)

$$\text{Washington—Bessel} = +\,0''.44 \pm 0''.59\;;$$

and lastly, from 9 observations at the Cape, of which two were manifestly to be excluded, but, by reason of their equality on the two sides of the mean, exerted no essential influence on the result,

$$\text{Maclear—Greenwich} = +\,0''.39 \pm 0''.31.$$

The incompatibility of some of these determinations is apparent, and the first five equations require therefore to be combined with one another, according to the method of least squares, after giving to each an appropriate weight. The values resulting from this combination have been adopted. They are:

$$\begin{aligned} \text{Bessel—Washington} &= -0''.76 \\ \text{Bessel—Santiago} &= -0''.06 \\ \text{Bessel—Greenwich} &= +0''.23 \end{aligned}$$

Hence we also have,

$$\text{Bessel—Maclear} = -0''.16.$$

For southern stars we obtain, by 20 observations,

$$\text{Argelander—Washington} = +1''.74 \pm 0''.40,$$

and by 12 observations,

$$\text{Washington—Ann Arbor} = +1''.58 \pm 0''.35,$$

whence,

$$\text{Argelander—Ann Arbor} = +3''.32.$$

These corrections were uniformly applied, as also were the following equations as previously determined for the declinations under consideration, excepting for the one zone of Lalande already mentioned.

They are taken from Argelander's *Positiones Mediæ* and Southern Zones, Struve's *Positiones Mediæ*, and Mädler's *Fixstern-system II*, as cited by Dr. Förster in his excellent paper in N°. 1026 of the *Astronomische Nachrichten*.

$$\begin{aligned} \text{Bessel—Taylor} &= -1''.32 \\ \text{Bessel—Twelve-Year} &= -0''.40 \\ \text{Bessel—Rümker} &= -0''.70 \\ \text{Bessel—Piazzi} &= \text{Bessel—Lalande} \\ &= -3''.6 \text{ for } \delta = +15^\circ \\ &\quad\; -3''.3 \qquad\quad +20^\circ \\ &\quad\; -2''.8 \qquad\quad +25^\circ \end{aligned}$$

$$\begin{aligned} \text{Argelander—Taylor} &= +0''.50 - 0''.0256\ (\delta^\circ + 19^\circ) \\ \text{Argelander—Piazzi} &= \text{Argelander—Lalande} \\ &= -1''.52 \text{ for } \delta = -16^\circ \\ &\quad\; -1\ .23 \qquad\quad 18^\circ \\ &\quad\; -0\ .84 \qquad\quad 20^\circ \\ &\quad\; -0\ .25 \qquad\quad 22^\circ \\ &\quad\; +0\ .54 \qquad\quad 24^\circ \\ &\quad\; +1\ .30 \qquad\quad 26^\circ \\ &\quad\; +1\ .90 \qquad -28^\circ \end{aligned}$$

Lalande's zone of 1796, March 4, contains the stars N$^{os.}$ 70, 74, 81, 89, 94, 97, 100, 101. To these has been applied the correction $-2''.3$ in order to reduce them to positions corresponding differentially to the places adopted for the fundamental stars in the reduction. Twenty of these were from Rümker, five from the Twelve-Year Catalogue, and one from Argelander's *Positiones Mediæ*. The mean by weights of the reductions to Bessel for the totality of these stars is, $-0''.60$, making the entire correction to Lalande, $-2''.9$.

The observations thus corrected may be advantageously combined by allowing to each determination a weight proportionate to the product of the number of observations by a factor constant for each authority. This factor should depend not only on the probable error of the authority, but also, in some measure, upon the time elapsed since the observation—that the influence of undetected proper motions may not be too prejudicial.

Combining the materials in this way, we may deduce a table of definite places of great precision, which may be practically treated like careful determinations by one and the same observer. So important is it, however, in the present discussion, that all the comparison-stars

and all the meridian observations should be really portions of one system referred to the identical co-ordinate plane, that the labor of an additional approximation for the better determination of the personal equations in declination is trivial in comparison with the advantages to accrue from a more trustworthy determination of the corrections to the scale of the standard observer. These are, of course, accompanied by a slight increase in the precision of the adopted places of comparison-stars.

Accordingly, the places deduced from all those authorities, for which the personal equation has not been implicitly taken from the books, have been carefully compared with the table alluded to, in order that the resultant equations, even if not so trustworthy as those deducible from more extended comparisons and investigations, may at least possess an accuracy in some degree proportionate to the influence which they must exert upon the resulting value of the parallax.

It is not to be expected, indeed, that the observations from Bessel and Argelander themselves would indicate an absolute mean accordance with our final table; but it is certainly to be hoped that the positions of that table will be more accordant with the average places of Bessel and Argelander than would be the case for the limited number of stars taken from the zones of these astronomers and here employed.

The discussion of the personal equations soon made it manifest that the results for each planet-series ought to be separately examined, the corrections being, at least in some cases, very clearly more different than may fairly be attributable to the mere difference of the declinations. This was especially evident in the two meridian series at the Cape of Good Hope, but not less distinctly in the stars from the Greenwich Catalogue for 1850.

Thus, after incorporating the values given by some additional stars which, although not employed for micrometic comparison, yet required investigation, on account of their importance in determining the corrections of the meridian series at the Cape and at Athens, we have—

From twenty-three stars observed with the first *Mars*-series,
Bessel — Greenwich $= + 1''.09 \pm 0''.995$;
From eight stars observed with the second *Mars*-series,
Bessel — Greenwich $= - 0''.14 \pm 0''.772$.

The table of definite places constructed from the materials already cited need not be given here, as its employment was only provisional. The results of its comparison with the several series of declinations afford the corrections to be employed in the new preparation of a table precisely similar. These corrections afford a legitimate criterion for judging of the accuracy attained and attainable. For they must, of course, be applied to the series of absolute meridian determinations of the planet's place, as well as to the star-places derived from the same authority, before incorporating them with their appropriate weight in the final list of star-places. Only under such conditions would the combination of the absolute positions obtained by meridian observation at different observatories be tolerable. And it so happens that neither for any one of the four observatories which have furnished meridian observations of the planet, nor for either of the other two on which drafts have been made for recent star-determinations, is any sufficient determination of the personal equation in declination at hand.

The places of the table are to be considered as representing the general standard of Bessel for the northern, and Argelander for the southern stars. Their comparison with individual authorities furnishes the following equations, in which T denotes the tabular declination:

For stars observed with *Mars* I:
T — Greenwich $= + 0''.099 \pm 0''.142$ from 29 observ'ns, exclud'g three, (Nos. 25, 35, 14.)
T — Bessel $= - 0''.287 \pm 0''.259$ from 24 observations, excluding one, (No. 2.)
T — Maclear $= - 0''.591 \pm 0''.188$ from 14 observations.
T — Washington $= - 0''.517 \pm 0''.096$ from 14 observations.

For stars observed with *Mars* II:

T — Santiago $= - 0''.120 \pm 0''.091$ from 41 observations.
T — Bessel $= + 0''.471 \pm 0''.293$ from 32 observations.
T — Maclear $= - 1''.325 \pm 0''.234$ from 13 observations, excluding one, (*Pollux.*)
T — Greenwich $= - 0''.056 \pm 0''.206$ from 6 observations, excluding one, (N°. 100.)
T — Washington $= - 0''.238 \pm 0''.054$ from 17 observations, excluding one, (N°. 95.)

For stars observed with *Venus* I:

T — Washington $= + 1''.696 \pm 0''.114$ from 38 obs., or excl. 4, (N^os^. 112, 127, 141, 144,)
$= + 1''.727 \pm 0''.064$.
T — Argelander $= + 0''.063 \pm 0''.276$.
T — Ann Arbor $= + 3''.348 \pm 0''.261$.

For stars observed with *Venus* II:

T — Bessel $= + 0''.136 \pm 0''.096$.

The large values of the differences for the observations taken from Bessel's Zones need not be considered as implying any deviation from Bessel's standard, but are, in every case, traceable to deviations of particular zones made manifest by comparison with at least two independent authorities.

This discordance or deviation is especially evident in zone 275, as will be clearly seen on collation of the equations, which are deduced after the omission of comparisons with the stars of this zone. Thus, the value of (Santiago—Bessel) which, by the use of all thirty-one differences, was found to be $+ 0''.565 \pm 0''.380$, was reduced, after exclusion of the four differences dependent on zone 275, to $+ 0''.141 \pm 0''.363$. So also the value of (Washington—Bessel) which, if the places from zone 275 be employed, is $= + 0''.44 \pm 0''.59$, becomes, after rejection of these, $= - 0''.06 \pm 0''.53$. And of the three series for *Mars* I, into which these stars enter appreciably, the equations above given are changed by the omission of this zone to the following:

T — Santiago $= - 0''.089 \pm 0''.086$.
T — Washington $= + 0''.176 \pm 0''.056$.
T — Bessel $= + 0''.163 \pm 0''.287$.

The correction apparently due to these stars is, if constant, about 3'', but the observations are much better satisfied if the correction be supposed to change with the time. Since none of the places from this zone are absolutely necessary for our purpose, they have been omitted in taking the final mean, although given in the list for comparison. A somewhat similar case is that of zone 405, which has, however, been retained.

From examination and combination of these results, the equations have been ultimately determined which are to be used in connection with the declinations, as furnished by the observatories under consideration.

They are as follows, and have been uniformly applied to all measured declinations, whether of star or of planet. The reductions applied to star-places from other sources are employed as cited on page cxx.

T — Washington $= - 0''.5$ for stars observed with *Mars* I.
T — " $= - 0''.2$ " " " " *Mars* II.
T — " $= + 1''.7$ " " " " *Venus* I.
T — Santiago $= - 0''.1$
T — Greenwich $= 0$
T — Maclear $= - 0''.6$ for stars observed with *Mars* I.
T — " $= - 1''.3$ " " " " *Mars* II.

The declinations from Bessel's Zone 275 are not employed for the mean.

The annexed Final List of places of comparison-stars gives for each star the several authorities; the number of observations from each, both in right-ascension and declination, these numbers

being inclosed in a parenthesis and separated by a dot; the declinations, taken from the special lists and reduced by means of the equations just given to the standard of Bessel for northern, and of Argelander for southern stars; the mean of the right-ascensions to the nearest second, and for the declinations the rigorous mean by weights; and lastly, inclosed in brackets, the sum of the several partial weights for the declinations. The factors for the several authorities, which, when combined with the number of observations, constitute the partial weights, are:

For Piazzi and Lalande...........................	1
For Bessel, Taylor, Rümker, and Lamont...	3
For Struve's and Argelander's Catalogues...	10
For all other sources................................	5

FINAL LIST OF STAR-POSITIONS.

1 — 1850.0.

		h. m. s.	° ′ ″
Lalande 9531	1.1)	4 56 36.50	+26 13 5.8
Piazzi IV, 287	(8.9)	36.83	5.8
Bessel 396, 523	(2.1)	36.70	6.0
Taylor 1808	(4.4)	36.69	6.0
Maclear	(8.8)	36.70	6.0
Greenwich 335	(2.1)	36.56	6.8
[70]		4 56 37	+26 13 6.03

2 — 1850.0.

		h. m. s.	° ′ ″
Bessel 396	(1.1)	5 3 4.68	+26 16 16.5
Greenwich 350	(5.5)	4.64	19.8
Washington	(3.12)	4.64	19.3
[88]		5 3 5	+26 16 19.35

3 — 1850.0.

		h. m. s.	° ′ ″
Bessel 405	(1.1)	5 10 29.92	+26 5 51.3
Greenwich 361	(3.3)	29.37	49.1
Washington	(3.10)	29.37	48.6
[68]		5 10 29	+26 5 48.82

4 — 1850.0.

		h. m. s.	° ′ ″
Bessel 523	(1.1)	5 17 47.40	+26 26 51.7
Greenwich 376	(4.4)	47.93	55.4
Washington	(2.10)	47.91	53.3
[73]		5 17 48	+26 26 53.81

5 — 1850.0.

		h. m. s.	° ′ ″
Bessel 405	(1.1)	5 21 43.09	+26 27 49.2
Greenwich 383	(2.2)	43.27	45.9
Washington	(2.11)	43.14	46.6
[68]		5 21 43	+26 27 46.61

6 — 1849.0.

		h. m. s.	° ′ ″
Bessel 405	(1.1)	5 22 32.26	+26 34 5.9
[3]		5 22 32	+26 34 5.9

7 — 1849.0.

		h. m. s.	° ′ ″
Bessel 405	(1.1)	5 25 40.14	+26 27 2.6
[3]		5 25 40	+26 27 2.6

8 — 1849.0.

		h. m. s.	° ′ ″
Bessel 405	(1.1)	5 29 33.19	+26 31 29.6
Maclear	(7)		26.9
Greenwich 401	(3.4)	32.90	27.3
Washington	(3.12)	32.91	27.7
[118]		5 29 33	+26 31 27.44

9 — 1849.0.

		h. m. s.	° ′ ″
Lalande 10669	(1.1)	5 32 12.11	+26 31 49.0
Maclear	(7.8)	12.38	52.1
Greenwich 406	(7.7)	12.53	51.5
[76]		5 32 12	+26 31 51.78

10 — 1849.0.

		h. m. s.	° ′ ″
Lalande 11108	(1.1)	5 44 35.76	+26 22 58.8
Maclear	(2.5)	35.75	23 1.5
Greenwich 422	(1.1)	34.81	23 1.5
[31]		5 44 35	+26 23 1.41

11 — 1849.0.

		h. m. s.	° ′ ″
Bessel 405	(1.1)	5 46 14.93	+26 26 47.9
Greenwich 426	(5.5)	14.82	45.9
Washington	(1.10)	14.96	46.8
[78]		5 46 15	+26 26 46.55

12 — 1849.0.

		h. m. s.	° ′ ″
Lalande 11220	(1.1)	5 48 37.61	+25 55 41.5
Piazzi V, 273	(8.8)	37.45	44.0
Taylor 2220	(9.4)	37.67	44.2
Twelve-Year 515	(3.5)	37.60	45.7
Maclear	(2.3)	38.09	45.6
Greenwich 433	(3.3)	37.56	46.6
[76]		5 48 38	+25 55 45.38

13 — 1849.0.

		h. m. s.	° ′ ″
Rümker 1673	(1.1)	5 54 3.71	+26 16 30.8
Greenwich 438	(6.6)	3.94	30.6
Washington	(1.10)	3.94	30.1
[83]		5 54 4	+26 16 30.31

Final List of Star-Positions—Continued.

14		h. m. s.	1849.0. ° ′ ″
Bessel 405	(1.1)	5 54 28.72	+26 21 2.1
Rümker 1680	(1.1)	28.09	20 59.6
Greenwich 439	(2.3)	28.46	20 57.9
Washington	(1.11)	27.73	21 0.6
[76]		5 54 28	+26 21 0.09

15		h. m. s.	1849.0. ° ′ ″
Lalande 11684	(1 1)	6 1 30.72	+26 2 14.0
Bessel 405	(1.1)	30.64	16.4
Rümker 1737	(5.5)	30.52	15.0
Maclear	(3)		17.3
Greenwich 451	(6.6)	30.57	16.1
[64]		6 1 31	+26 2 16.10

16		h. m. s.	1849.0. ° ′ ″
Lalande 11714	(1.1)	6 2 22.10	+26 0 39.3
Bessel 405	(1.1)	22.20	43.9
Greenwich 453	(6.4)	22.31	41.7
[24]		6 2 22	+26 0 41.88

17		h. m. s.	1849.0. ° ′ ″
Lalande 11854	(1.1)	6 6 5.03	+25 22 23.9
Maclear	(1)	5.33	
Greenwich 457	(5.5)	5.22	23.1
[26]		6 6 5	+25 22 23.13

18		h. m. s.	1849.0. ° ′ ″
Lalande 11946	(1.1)	6 7 35.06	+25 32 18.3
Rümker 1783	(1.1)	35.27	15.8
Maclear	(2)	35.07	
Greenwich 458	(4.4)	35.12	22.8
[24]		6 7 35	+25 32 21.74

19		h. m. s.	1849.0. ° ′ ″
Lalande 11976, 8	(2.2)	6 9 25.10	+25 35 3.2
Greenwich 459	(2.2)	26.16	2.6
[12]		6 9 26	+25 35 2.70

20		h. m. s.	1849.0. ° ′ ″
Bessel 405	(1.1)	6 11 31.75	+25 45 49.0
Greenwich 467	(4.3)	31.81	45.7
[18]		6 11 32	+25 45 46.25

21		h. m. s.	1849.0. ° ′ ″
Lalande 12197, 9	(2.2)	6 15 25.35	+25 7 16.7
Bessel 405	(1.1)	25.82	20.8
Taylor 2456	(6.6)	25.64	19.9
Maclear	(4.5)	25.62	20.0
Greenwich 470	(2.2)	25.65	20.9
[58]		6 15 26	+25 7 20.05

22		h. m. s.	1849.0. ° ′ ″
Lalande 12237	(1.1)	6 16 47.33	+25 35 28.4
Bessel 405	(1.1)	46.93	25.8
Greenwich 473	(4.2)	46.90	24.2
[14]		6 16 47	+25 35 24.84

23		h. m. s.	1849.0. ° ′ ″
Bessel 523	(1.1)	6 17 58.70	+25 27 23.6
[3]		6 17 59	+25 27 23.6

24		h. m. s.	1849.0. ° ′ ″
Bessel 348	(1.1)	6 18 45.23	+24 20 31.0
[3]		6 18 45	+24 20 31.0

25		h. m. s.	1849.0. ° ′ ″
Lalande 12336, 7	(2.2)	6 19 24.16	+25 42 32.2
Bessel 523	(1.1)	24.62	33.4
Maclear	(3.3)	24.53	33.9
Greenwich 479	(1.1)	23.83	30.6
[25]		6 19 25	+25 42 33.04

26		h. m. s.	1849.0. ° ′ ″
Bessel 523	(1.1)	6 21 2.59	+25 14 26.6
Greenwich 485	(2.2)	2.27	27.0
[13]		6 21 2	+25 14 26.91

27		h. m. s.	1849.0. ° ′ ″
Lalande 12395	(1.1)	6 21 9.61	+25 46 38.1
Maclear	(2)	10.51	
Greenwich 487	(1.2)	10.68	40.8
[11]		6 21 11	+25 46 40.55

28		h. m. s.	1849.0. ° ′ ″
Bessel 523	(1.1)	6 21 36.16	+25 31 15.4
Greenwich 488	(2.2)	36.24	16.5
[13]		6 21 36	+25 31 16.25

29		h. m. s.	1849.0. ° ′ ″
Greenwich	(1.1)	6 25 26.67	+26 33 51.6
[5]		6 25 27	+26 33 51.6

30		h. m. s.	1849.0. ° ′ ″
Lalande 12554	(1.1)	6 25 44.14	+25 1 57.8
Bessel 405	(1.1)	44.74	59.2
Greenwich 490	(1.1)	44.27	56.0
[9]		6 25 44	+25 1 57.27

31		h. m. s.	1849.0. ° ′ ″
Lalande 12557	(1.1)	6 25 47.09	+24 44 45.4
Greenwich 491	(1.1)	46.64	44.4
[6]		6 25 47	+24 44 44.57

32		h. m. s.	1849.0. ° ′ ″
Bessel 348	(1.1)	6 27 21.07	+24 32 48.7
Greenwich 495	(1.1)	21.09	49.3
[8]		6 27 21	+24 32 49.08

Final List of Star-Positions—Continued.

No.	Star		h. m. s.	° ′ ″
33				1849.0.
	Bessel 348	(1.1)	6 27 52.80	+ 24 31 4.5
	Greenwich 496	(1.1)	52.67	4.9
		[8]	6 27 53	+ 24 31 4.75
34				1849.0.
	Lalande 12666	(1.1)	6 28 45.41	+ 24 57 28.6
	Bessel 348, 405	(2.2)	46.37	23.7
		[7]	6 28 46	+ 24 57 24.40
35				1849.0.
	Lalande 12880	(1.1)	6 34 38.43	+ 25 16 25.7
	Taylor 2632	(17.45)	38.46	29.0
	Rümker 1979	(16.13)	38.31	30.3
	Twelve-Year 587	(22.19)	38.40	30.1
	Maclear	(3.3)	38.42	28.2
	Greenwich 505	(8.7)	38.37	32.0
		[320)	6 34 38	+ 25 16 29.76
36				1852.0.
	Bessel 276	(1.1)	7 26 52.19	+ 15 15 1.4
		[3]	7 26 52	+ 15 15 1.4
37				1852.0.
	Bessel 273, 276	(2.2)	7 29 28.30	+ 15 24 42.2
		[6]	7 29 28	+ 15 24 42.2
38				1852.0.
	Bessel 146	(1.1)	7 29 28.97	+ 14 40 6.9
		[3]	7 29 29	+ 14 40 6.9
39				1852.0.
	Bessel 273	(1.1)	7 30 38.00	+ 14 53 36.6
		[3]	7 30 38	+ 14 53 36.6
40				1852.0.
	Bessel 273	(1.1)	7 30 58.15	+ 14 47 39.1
		[3]	7 30 58	+ 14 47 39.1
41				1852.0.
	Bessel 273, 276	(2.2)	7 32 44.34	+ 15 40 22.0
		[6]	7 32 44	+ 15 40 22.0
42				1852.0.
	Lalande 14961	(1.1)	7 33 42.26	+ 14 33 0.2
	Bessel 62, 146	(2.2)	42.38	0.9
		[7]	7 33 42	+ 14 33 0.80
43				1852.0.
	Bessel 273	(1.1)	7 33 49.55	+ 15 49 51.1
		[3]	7 33 50	+ 15 49 51.1
44				1852.0.
	Lalande 15125	(1.1)	7 38 57.81	+ 15 53 0.6
		[1]	7 38 58	+ 15 53 0.6
45				1852.0.
	Lalande 15221	(1.1)	7 41 51.39	+ 24 9 13.3
	Bessel 339	(1.1)	51.67	12.5
		[4]	7 41 52	+ 24 9 12.70
46				1852.0.
	Lalande 15338	(1.1)	7 44 52.83	+ 15 58 40.4
		[1]	7 44.53	+ 15 58 40.4
47				1852.0.
	Lalande 15401	(1.1)	7 46 36.34	+ 24 44.48.1
	Santiago	(3.3)	36.58	50.9
		[16]	7 46 36	+ 24 44 50.72
48				1852.0.
	Lalande 15412	(1.1)	7 46 52.98	+ 24 36 41.7
	Santiago	(3.3)	57.25	49.0
		[16]	7 46 57	+ 24 36 48.54
49				1852.0.
	Bessel 341	(1.1)	7 47 5.64	+ 25 3 0.0
	Struve Cat. Gen.	(4.4)	5.74	2.7
	Santiago	(3.3)	5.71	3.2
		[58]	7 47 6	+ 25 3 2.69
50				1852.0.
	Bessel 339	(1.1)	7 47 14.74	+ 24 0 37.9
		[3]	7 47 15	+ 24 0 37.9
51				1852.0.
	Lalande 15468	(1.1)	7 48 35.29	+ 16 10 56.8
	Taylor 3306	(5.7)	35.19	52.3
	Rümker 2335	(3.2)	35.08	53.8
	Twelve-Year 709	(6.5)	35.04	52.4
	Wrottesley	(5)	35.00	
		[53]	7 48 35	+ 16 10 52.60
52				1852.0.
	Bessel 339, 341	(2.2)	7 48 38.35	+ 24 54 9.2
	Santiago	(5.5)	38.31	11.7
		[31]	7 48 38	+ 24 54 11.22
53				1852.0.
	Lalande 15548	(1.1)	7 50 53.27	+ 23 34 50.1
		[1]	7 50 53	+ 23 34 50.1
54				1852.0.
	Bessel 339	(1.1)	7 50 59.17	+ 24 28 27.8
	Santiago	(3.3)	59.58	27.0
		[18]	7 50 59	+ 24 28 27.

Final List of Star-Positions—Continued.

55

		h. m. s.	1852.0. ° ′ ″
Lalande 15608	(1.1)	7 52 38.26	+24 18 57.3
Bessel 339	(1.1)	38.37	59.0
Santiago	(3.3)	38.37	58.7
	[19]	7 52 38	+24 18 58.67

56

		h. m. s.	1852.0. ° ′ ″
Bessel 273	(1.1)	7 53 31.44	+ 15 58 1.3
Rümker	(1.1)	31.56	1.4
	[6]	7 53 31	+ 15 58 1.35

57

		h. m. s.	1852.0. ° ′ ″
Bessel 341	(1.1)	7 55 2.91	+25 0 23.2
Santiago	(15.15)	3.29	20.8
	[78]	7 55 3	+25 0 20.89

58

		h. m. s.	1852.0. ° ′ ″
Lalande 15707	(1.1)	7 55 15.43	+24 55 6.9
Bessel 339, 341	(2.2)	15.60	9.0
Greenwich 589	(3.3)	15.48	10.8
Santiago	(6.6)	15.59	10.2
Maclear	(3)		10.1
	[67]	7 55 15	+24 55 10.16

59

		h. m. s.	1852.0. ° ′ ″
Bessel 278, 279	(2.2)	7 59 15.42	+22 50 45.4
	[6]	7 59 15	+22 50 45.4

60

		h. m. s.	1852.0. ° ′ ″
Bessel 341	(1.1)	7 59 24.42	+24 52 39.4
Santiago	(3.3)	24.13	42.3
	[18]	7 59 24	+24 52 41.83

61

		h. m. s.	1852.0. ° ′ ″
Lalande 16068	(1.1)	8 5 27.00	+16 4 20.7
	[1]	8 5 27	+16 4 20.7

62

		h. m. s.	1852.0. ° ′ ″
Bessel 341	(1.1)	8 6 15.64	+24 47 1.2
Santiago	(6.6)	16.01	0.1
	[33]	8 6 16	+24 47 0.20

63

		h. m. s.	1852.0. ° ′ ″
Lalande 16236	(1.1)	8 10 14.53	+21 57 0.6
Bessel 278	(1.1)	14.30	57 3.8
	[4]	8 10 14	+21 57 3.00

64

		h. m. s.	1852.0. ° ′ ″
Lalande 16288, 90, 91	(3.3)	8 11 42.78	+ 24 29 0.2
Piazzi VIII, 41	(12.8)	43.68	2.7
Bessel 344	(1.1)	43.39	1.4
Taylor 3519	(6.5)	43.85	5.4
Rümker 2476	(3.3)	43.66	2.0
Twelve-Year 745	(12.17)	43.68	3.1
Santiago	(32.33)	43.69	2.7
Greenwich 608	(7.7)	43.82	3.7
Maclear	(1.8)		4 4
	[413]	8 11 44	+ 24 29 3.29

65

		h. m. s.	1852.0. ° ′ ″
Bessel 273	(1.1)	8 11 51.45	+ 15 55 48.5
	[3]	8 11 51	+ 15 55 48.5

66

		h. m. s.	1852.0. ° ′ ″
Santiago	(2.2)	8 13 9.72	+ 24 29 21.3
Washington	(2)		23.7
	[20]	8 13 10	+ 24 29 22.50

67

		h. m. s.	1852.0. ° ′ ″
Bessel 273	(1.1)	8 14 58.99	+ 15 44 33.5
	[3]	8 14 59	+ 15 44 33.5

68

		h. m. s.	1852.0. ° ′ ″
Lalande 16477	(1.1)	8 16 5.82	+ 24 25 7.7
Bessel 344	(1.1)	8.46	1.7
Santiago	(3.8)	8.37	5.9
Washington	(2)		5.3
	[29]	8 16 8	+ 24 25 5.32

69

		h. m. s.	1852.0. ° ′ ″
Lalande 16464	(1.1)	8 16 35.74	+24 1 30.3
Bessel 344	(1.1)	35.65	32.7
Santiago	(2.2)	35.76	31.9
Washington	(1)		32.1
	[19]	8 16 36	+24 1 31.99

70

		h. m. s.	1852.0. ° ′ ″
Lalande 16582	(1.1)	8 19 29.34	+21 38 19.6
Bessel 278	(1.1)	29.49	14.7
	[4]	8 19 26	+21 38 15.92

71

		h. m. s.	1852.0. ° ′ ″
Santiago	(4.4)	8 19 47.03	+ 24 9 40.5
	[20]	8 19 47	+ 24 9 40.5

72

		h. m. s.	1852.0. ° ′ ″
Santiago	(3.3)	8 19 49.74	+ 24 19 43.1
	[15]	8 19 50	+ 24 19 43.1

Final List of Star-Positions—Continued.

73

		1852.0. h. m. s.	1852.0. ° ′ ″
Santiago	(2.2)	8 20 54.98	+24 5 30.9
[10]		8 20 55	+24 5 30.9

74

		1852.0. h. m. s.	1852.0. ° ′ ″
Lalande 166	(1.1)	8 21 43.73	+21 20 54.3
[1]		8 21 44	+21 20 54.3

75

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 273	(1.1)	8 24 24.81	+15 46 19.4
Rümker A. N. VIII, 13	(1.1)	24.81	20.9
[6]		8 24 25	+15 46 20.15

76

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 273	(1.1)	8 26 58.52	+16 14 7.8
[3]		8 26 59	+16 14 7.8

77

		1852.0. h. m. s.	1852.0. ° ′ ″
Santiago	(3.3)	8 27 31.61	+23 58 5.5
[15]		8 27 32	+23 58 5.5

78

		1852.0. h. m. s.	1852.0. ° ′ ″
Santiago	(3.3)	8 28 2.93	+23 34 17.2
[15]		8 28 3	+23 34 17.2

79

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 344	(1.1)	8 28 14.72	+23 45 40.6
Santiago	(3.3)	14.64	37.9
Washington	(1)		36.6
[23]		8 28 15	+23 45 37.97

80

		1852.0. h. m. s.	1852.0. ° ′ ″
Santiago	(3.3)	8 30 11.69	+23 24 21.1
Washington	(1)		22.5
[20]		8 30 12	+23 24 21.45

81

		1852.0. h. m. s.	1852.0. ° ′ ″
Lalande 17013	(1.1)	8 31 11.55	+20 36 11.6
Piazzi VIII, 121	(4.4)	11.09	12.8
Rümker A N. VIII, 19	(1.1)	11.49	11.7
[8]		8 31 11	+20 36 12.24

82

		1852.0. h. m. s.	1852.0. ° ′ ″
Santiago	(3.3)	8 31 40.84	+23 16 11.8
[15]		8 31 41	+23 16 11.8

83

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 274	(1.1)	8 32 25.23	+18 46 12.9
Rümker 2613	(1.1)	25.02	15.3
Hamburg A. N. 1016	(3.3)	25.51	14.8
[21]		8 32 25	+18 46 14.60

84

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 274	(1.1)	8 32 35.87	+19 0 43.0
[3]		8 32 36	+19 0 43.0

85

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 278, 344	(2.2)	8 35 6.84	+23 14 31.6
Santiago	(2.2)	6.61	31.3
Washington	(2)		32.0
[26]		8 35 7	+23 14 31.64

8

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 274	(1.1)	8 39 24.80	+18 35 42.7
[3]		8 39 25	+18 35 42.7

87

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 344	(1.1)	8 40 18.10	+22 44 41.3
Santiago	(2.2)	17.65	42.3
[13]		8 40 18	+22 44 42.07

88

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 278	(1.1)	8 44 14.84	+22 33 34.7
Santiago	(4.4)	15.23	33.6
[23]		8 44 15	+22 33 33.74

89

		1852.0. h. m. s.	1852.0. ° ′ ″
Lalande 17513	(1.1)	8 45 28.00	+22 51 38.5
Bessel 278, 345	(2.2)	28.02	38.0
Greenwich 640	(6.6)	27.95	37.6
Santiago	(3.3)	27.91	38.7
[52]		8 45 28	+22 51 37.98

90

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 278	(1.1)	8 45 57.84	+22 22 45.2
Santiago	(3.3)	58.07	44.3
Washington	(2)		45.7
[28]		8 45 58	+22 22 44.90

91

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 278	(1.1)	8 47 26.12	+22 15 15.0
Santiago	(4.4)	26.09	15.3
Washington	(1)		16.1
Königsberg A. N. 294	(13.13)	26.04	16.9
Dorpat A. N. 303	(6.5)	26.06	(20.5)
[95]		8 47 26	+22 15 16.45

92

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 278	(1.1)	8 47 32.84	+22 8 46.3
Santiago	(3.3)	32.71	46.8
Dorpat A. N. 303	(2.2)	32.41	47.7
[28]		8 47 33	+22 8 47.07

93

		1852.0. h. m. s.	1852.0. ° ′ ″
Bessel 278	(1.1)	8 48 54.49	+21 54 57.4
Twelve-Year 789	(5.6)	54.40	57.3
Greenwich 645	(4.4)	54.48	58.2
Santiago	(2.2)	54.43	58.7
[63]		8 48 54	+21 54 57.81

Final List of Star-Positions—Continued.

94 — 1852.0.

		h. m. s.	° ′ ″
Lalande 17690	(1.1)	8 50 25.94	+ 21 44 17.9
Bessel 278	(1.1)	25.60	15.4
Twelve-Year 795	(5.6)	25.52	13.7
Santiago	(6.6)	25.60	12.8
Washington	(1)		13.8
[69]		8 50 26	+ 21 44 13.45

95 — 1852.0.

		h. m. s.	° ′ ″
Bessel 278	(1.1)	8 52 12.29	+ 22 2 30.6
Santiago	(3.3)	13.18	29.7
Washington	(1)		27.1
[23]		8 52 13	+ 22 2 29.25

96 — 1852.0.

		h. m. s.	° ′ ″
Bessel 278	(1.1)	8 53 47.48	+ 21 34 9.5
Santiago	(3.3)	47.20	8.1
Washington	(2)	. . . .	8.9
[28]		8 53 47	+ 21 34 8.54

97 — 1852.0.

		h. m. s.	° ′ ″
Lalande 17937	(1.1)	8 58 16.44	+ 21 6 21.5
Bessel (275), 278	(2.1)	16.32	(24.4)
Santiago	(5.5)	16.46	22.7
Washington	(2)		23.4
[36]		8 58 16	+ 21 6 22.86

98 — 1852.0.

		h. m. s.	° ′ ″
Bessel 278	(1.1)	8 59 27.25	+ 21 29 20.6
Santiago	(3.3)	27.31	20.7
Washington	(2)		23.4
[28]		8 59 27	+ 21 29 21.65

99 — 1852.0.

		h. m. s.	° ′ ″
Bessel 277, 278	(2.2)	9 3 20.29	+ 20 57 20.4
Santiago	(2.2)	20.26	22.0
[16]		9 3 20	+ 20 57 21.40

100 — 1852.0.

		h. m. s.	° ′ ″
Lalande 18105	(1.1)	9 3 19.34	+ 21 1 48.8
Bessel (275), 277, 278	(3.2)	19.67	(45.6)
Greenwich 659	(3.3)	19.49	48.4
Santiago	(2.2)	19.79	44.9
[32]		9 3 20	+ 21 1 46.79

101 — 1852.0.

		h. m. s.	° ′ ″
Lalande 18132	(1.1)	9 4 16.61	+ 21 16 57.5
Bessel 278	(1.1)	16.49	53.3
Twelve-Year 809	(5.6)	16.47	52.2
Greenwich 661	(5.5)	16.43	51.1
Santiago	(3.3)	16.55	51.3
Maclear	(1.1)		51.7
[79]		9 4 16	+ 21 16 51.76

102 — 1851.0.

		h. m. s.	° ′ ″
Bessel 275	(1.1)	9 4 23.04	+ 20 37 (50.2)
Santiago	(3.3)	23.45	52.7
Washington	(1)		53.7
[20]		9 4 23	+ 20 37 52.95

103 — 1851.0.

		h. m. s.	° ′ ″
Bessel 275	(1.1)	9 7 22.07	+ 19 51 (42.8)
Santiago	(2.2)	22.38	45.7
[10]		9 7 22	+ 19 51 45.7

104 — 1851.0.

		h. m. s.	° ′ ″
Rümker 2799	(1.1)	9 7 36.85	+ 20 41 22.1
Santiago	(2.2)	37.01	24.2
[13]		9 7 37	+ 20 41 23.72

105 — 1851.0.

		h. m. s.	° ′ ″
Rümker 2800	(1.1)	9 7 39.29	+ 20 28 1.5
Santiago	(3.3)	39.52	27 59.6
[18]		9 7 39	+ 20 27 59.92

106 — 1851.0.

		h. m. s.	° ′ ″
Bessel 275	(1.1)	9 8 10.57	+ 19 52 (22.3)
Santiago	(2.2)	10.96	26.2
[10]		9 8 11	+ 19 52 26.2

107 — 1851.0.

		h. m. s.	° ′ ″
Santiago	(4.4)	9 8 11.21	+ 20 15 48.4
Washington	(1)		49.6
[25]		9 8 11	+ 20 15 48.64

108 — 1851.0.

		h. m. s.	° ′ ″
Bessel 275	(1.1)	9 10 18.62	+ 20 2 (35.1)
Santiago	(3.3)	18.37	39.2
Washington	(2)		40.5
[25]		9 10 18	+ 20 2 39.72

109 — 1851.0.

		h. m. s.	° ′ ″
Piazzi IX, 50	(5.5)	9 12 14.18	+ 19 43 3.4
Taylor 4088	(4.4)	14.61	5.2
Rümker 2830	(3.3)	14.30	3.6
Santiago	(2.2)	14.29	4.9
Washington	(1)		6.8
[41]		9 12 14	+ 19 43 4.75

110 — 1850.0.

		h. m. s.	° ′ ″
Lalande 30556	(1.1)	16 40 55.21	− 26 28 28.8
Washington	(7)		27.9
[36]		16 40 55	− 26 28 27.92

111 — 1850.0.

		h. m. s.	° ′ ″
Argelander	(1.1)	16 42 56.13	− 26 39 29.5
Washington	(4)		30.9
[25]		16 42 56	− 26 39 30.62

112 — 1850.0.

		h. m. s.	° ′ ″
Argelander	(3.3)	16 49 11.81	− 21 52 19.3
Washington	(3)		22.1
Ann Arbor	(1)	15	21.0
[35]		16 49 12	− 26 52 20.74

Final List of Star-Positions—Continued.

113

		h. m. s.	1850.0. ° ′ ″
Argelander	(3.3)	16 50 4.99	— 26 56 35.3
Washington	(3)		35.7
Ann Arbor	(1)	8	33.5
[35]		16 50 5	— 26 56 35.21

114

		h. m. s.	1850.0. ° ′ ″
Lalande 30874	(1.1)	16 51 59.6	— 27 1 12.1
Argelander	(1.1)	59.11	17.2
Washington	(4)		18.1
[26]		16 51 59	— 27 1 17.70

115

		h. m. s.	1850.0. ° ′ ″
Argelander	(3.3)	16 54 41.98	— 26 59 41.4
Washington	(4)		41.4
[35]		16 54 42	— 26 59.41.4

116

		h. m. s.	1850.0. ° ′ ″
Argelander	(1.1)	16 59 44.18	— 27 11 48.4
Washington	(4)		47.0
[25]		16 59 44	— 27 11 47.28

117

		h. m. s.	1850.0. ° ′ ″
Argelander	(3.3)	17 7 7.73	— 27 23 9.6
Washington	(4)		8.1
[35]		17 7 8	— 27 23 8.74

118

		h. m. s.	1851.0. ° ′ ″
Piazzi XVII, 43	(14.15)	17 11 13.18	— 17 35 42.3
Taylor 8004	(4.3)	13.34	41.5
Argelander	(1.1)	13.39	40.9
Twelve-Year 1467	(5.4)	13.03	44.6
Washington	(4)		42.3
[69]		17 11 13	— 17 35 42.76

119

		h. m. s.	1850.0. ° ′ ″
Washington	(5)	17 12 50	— 27 50 53.0
Ann Arbor	(1)	54	52.5
[30]		17 12 50	— 27 50 52.92

120

		h. m. s.	1850.0. ° ′ ″
Argelander	(2.2)	17 13 22.27	— 27 31 24.2
Washington	(4)		24.8
Ann Arbor	(1)	25	24.9
[35]		17 13 22	— 27 31 24.64

121

		h. m. s.	1850.0. ° ′ ″
Washington	(1)	17 13 51	— 27 49 2.2
Ann Arbor	(1)	54	3.1
[10]		17 13 51	— 27 49 2.65

122

		h. m. s.	1851.0. ° ′ ″
Lalande 31543	(1.1)	17 13 55.45	— 17.33 7.5
Piazzi XVII, 63	(13.8)	55.18	9.8
Washington	(4)		8.9
Ann Arbor	(1)	58	7.6
[34]		17 13 55	— 17 33 8.88

123

		h. m. s.	1851.0. ° ′ ″
Lalande 31791, 2	(2.2)	17 21 17.78	— 17 41 14.0
Argelander	(2.2)	17.73	12.1
[12]		17 21 18	— 17 41 12.42

124

		h. m. s.	1851.0. ° ′ ″
Lalande 31931, 2	(2.2)	17 25 18.17	— 17 43 34.9
Washington	(5)		32.5
[27]		17 25 18	— 17 43 32.68

125

		h. m. s.	1850.0. ° ′ ″
Lamont	(2.1)	17 28 45.40	— 27 56 58.5
Washington	(4)		57.3
Ann Arbor	(1)	48	57.0
[28]		17 28 45	— 27 56 57.38

126

		h. m. s.	1851.0. ° ′ ″
Argelander	(1.1)	17 32 1.30	— 17 59 52.4
Washington	(3)		52.0
[20]		17 32 1	— 17 59 52.10

127

		h. m. s.	1851.0. ° ′ ″
Lalande 32426	(1.1)	17 38 44.31	— 18 2 47.2
Piazzi XVII, 221	(8.9)	44.23	44.1
Taylor 8219	(3.3)	44.37	44.6
Argelander	(2.2)	44.48	45.2
Washington	(6)		42.2
[59]		17 38 44	— 18 2 43.45

128

		h. m. s.	1850.0. ° ′ ″
Washington	(4)	17 43 52	— 28 0 54.6
Ann Arbor	(1)	56	54.0
[		17 43 52	— 28 0 54.48

129

		h. m. s.	1851.0. ° ′ ″
Lalande 32706	(1.1)	17 46 22.86	— 18 15 24.1
Argelander	(2.2)	22.57	29.1
Washington	(4)		27.8
[31]		17 46 23	— 18 15 28.10

130

		h. m. s.	1850.0. ° ′ ″
Lalande 32727	(1.1)	17 47 13.77	— 28 2 3.7
Washington	(4)		5.5
[21]		17 47 14	— 28 2 5.41

131

		h. m. s.	1850.0. ° ′ ″
Washington	(4)	17 52 24	— 27 51 58.2
[20]		17 52 24	— 27 51 58.2

132

		h. m. s.	1850.0. ° ′ ″
Lalande 32974	(1.1)	17 53 27.86	— 27 49 10.4
Lamont	(1)	27.48	
Washington	(4)		10.4
Ann Arbor	(1)	30	11.3
[26]		17 53 28	— 27 49 10.57

Final List of Star-Positions—Continued.

133		1850.0.	
		h. m. s.	° ′ ″
Argelander	(1.1)	17 55 54.16	—27 50 11.9
Washington	(4)		8.8
	[25]	17 55 54	—27 50 9.42

134		1850.0.	
		h. m. s.	° ′ ″
Washington	(4)	17 59 6	—27 39 25.4
Ann Arbor	(1)	2	25.6
	[25]	17 59 6	—27 39 25.44

135		1850.0.	
		h. m. s.	° ′ ″
Lalande 33214	(1.1)	17 59 50.16	—27 44(53.7)
Argelander	(1.1)	50.52	45 1.7
Washington	(4)		1.5
	[25]	1, 59 50	—27 45 1.54

136		1850.0.	
		h. m. s.	° ′ ″
Lalande 33394	(1.1)	18 4 7.34	—25 10 43.6
Argelander	(3.3)	7.37	54.0
Washington	(4)		53.0
	[36]	18 4 7	—25 10 53.16

137		1850.0.	
		h. m. s.	° ′ ″
Lalande 33427, 8	(2.2)	18 4 45.71	—27 32 5.3
Lamont	(1)	45.94	
Washington	(4)		8.9
	[22]	18 4 46	—27 32 8.57

138		1850.0.	
		h. m. s.	° ′ ″
Argelander	(2.2)	18 6 40.46	—25 45 4.0
Washington	(3)		6.5
	[25]	18 6 40	—25 45 5.50

139		1850.0.	
		h. m. s.	° ′ ″
Washington	(3)	18 7	—27 27 19.0
Ann Arbor	(1)	1	20.9
	[20]	18 7 1	—27 27 19.48

140		1850.0.	
		h. m. s.	° ′ ″
Piazzi XVIII, 24	(44.31)	18 8 39.86	—27 5 25.2
Taylor 8347	(5.4)	40.00	28.2
Washington	(4)		26.8
	[63]	18 8 40	—27 5 26.28

141		1851.0.	
		h. m. s.	° ′ ″
Lalande 33598	(1.1)	18 9 5.85	—18 50 47.3
Altona, *AN.* 149	(2.1)	5.54	(53.2)
Argelander	(4.4)	5.49	49.6
Washington	(3)		47.4
	[36]	18 9 5	—18 50 48.62

142		1850.0.	
		h. m. s.	° ′ ″
Washington	(3)	18 9 30	—25 59 9.6
	[15]	18 9 30	—25 59 9.6

143		1850.0.	
		h. m. s.	° ′ ″
Lamont	(4.1)	18 11 53.64	—26 8 43.2
Wrottesley	(5)	53.36	
Washington	(3)		42.4
Ann Arbor	(1)	53	43.9
	[23]	18 11 53	—26 8 42.83

144		1851.0.	
		h. m. s.	° ′ ″
Lalande 33748	(1.1)	18 12 37.55	—18 55 14.7
Altona *AN.*, 149	(3.2)	37.16	19.0
Lamont	(2.1)	36.76	18.4
Washington	(3)		14.1
	[29]	18 12 37	—18 55 16.26

145		1850.0.	
		h. m. s.	° ′ ″
Piazzi XVIII, 41	(4.4)	18 13 0.66	—26 28 46.4
Taylor 8458	(3.4)	0.98	49.8
Washington	(4)		48.7
	[36]	18 13 1	—26 28 48.81

146		1850.0.	
		h. m. s.	° ′ ″
Lalande 33855	(1.1)	18 15 19.59	—26 33 49.9
Argelander	(1.1)	19.17	51.2
Washington	(5)		54.1
	[31]	18 15 19	—26 33 53.50

147		1850.0.	
		h. m. s.	° ′ ″
Lalande 33989	(1.1)	18 18 22.92	—26 42 58.8
Lamont	(4.2)	22.75	43 0.0
Argelander	(1.1)	22.86	42 58.8
Wrottesley	(5)	22.50	
Washington	(6)		43 1.0
	[42]	18 18 23	—26 43 0.54

148		1851.0.	
		h. m. s.	° ′ ″
Piazzi XVIII, 95	(14.10)	18 23 42.99	—19 4 24.2
Taylor 8533	(3.4)	43.16	24.1
Argelander	(3.3)	42.99	24.0
Washington	(4)		23.8
	[57]	18 23 43	—19 4 23.99

A few of these stars exhibit indications of a proper motion, which, although hardly marked enough to warrant the adoption of any theory upon the subject, yet render it proper to introduce into the ultimate determination from the data at command a term dependent upon the time. This has been done for four stars, viz: N[os.] 12, 94, 101, and 109; and the redetermination of these upon the hypothesis of a proper motion gives the following results. The second column shows the place as given by the observer, after reduction to the mean equinox of the epoch; and the third contains this observed place as reduced to the scale of the standard observer. The remaining two give the assumed place and the residual discordance, upon the supposition of a proper motion:

	12.			
	Observed.	Reduced.	Computed.	C—O.
	° ′ ″	″	″	″
Lalande	+25 55 44.3	41.5	42.6	+1.1
Piazzi	46.8	44.0	43.2	—0.8
Taylor	45.5	44.2	45.1	+0.9
Twelve-Year . . .	46.1	45.7	45.5	—0.2
Maclear	46.2	45.6	45.9	+0.3
Greenwich	46.6	46.6	46.1	—0.5

The mean by weights is +25° 55′ 45″.38; but the assumption of a proper motion of +0″.055 gives +25° 55′ 45″.84, which has been adopted.

	94.			
	Observed.	Reduced.	Computed.	C—O.
	° ′ ″	″	″	″
Lalande	+21 44 20.8	17.9	18.1	+0.2
Bessel	15.4	15.4	15.3	—0.1
Twelve-Year . . .	14.1	13.7	14.3	+0.6
Santiago	12.8	12.8	13.1	+0.3
Washington . . .	14.0	13.8	12.8	—1.0

The mean by weights is +21° 44′ 13″.45; but the assumption of a proper motion of —0″.080 gives +21° 44′ 13″.14, which has been adopted.

	101.			
	Observed.	Reduced.	Computed.	C—O.
	° ′ ″	″	″	″
Lalande	+21 16 60.4	57.5	56.9	—0.6
Bessel	53.3	53.3	53.7	+0.4
Twelve-Year . . .	52.7	52.2	52.5	+0.3
Maclear	53.0	51.7	51.2	—0.5
Santiago	51.3	51.3	51.2	—0.1
Greenwich	51.1	51.1	51.2	+0.1

The mean by weights is +21° 16′ 51″.76; but the assumption of a proper motion of —0″.092 gives +21° 16′ 51″.22, which has been adopted.

	109.			
	Observed.	Reduced.	Computed	C—O.
	° ′ ″	″	″	″
Piazzi	+19 43 6.7	3.4	3.1	—0.3
Taylor	6.5	5.2	4.8	—0.4
Rümker	4.3	3.6	4.8	+1.2
Santiago	5.0	4.9	5.5	+0.6
Washington . . .	7.0	6.8	5.7	—1.1

The mean by weights is +19° 43′ 4″.75; but the assumption of a proper motion of +0″.037 gives +19° 43′ 5″.50, which has been adopted.

Fourteen of our 148 stars are to be found in the Catalogue of the British Association, viz:

No.	No. B.A.C.	No.	No. B.A.C.	No.	No. B.A.C.
1	1562	64	2729	140	6194
12	1896	109	3181	143	6214
21	2058	118	5839	147	6261
35	2194	125	5946	148	6301
51	2689	130	6063		

To eight of these stars a proper motion is assigned in the British Association Catalogue. It seems probable, however, only for two of these eight, and has in each case the contrary sign to those deduced above. For N[o.] 12, it is given as certainly not existing.

The discrepance is generally great, amounting in one case to 2[s.] in right-ascension, and 20″.7 in declination. The average of the discordances in declination is 5.″58, and the square root of the mean of the squares is 8.″1.

If we include in this examination those stars hereafter cited, which were observed with *Mars* on the meridian, although not strictly comparison-stars, we find that all but one of these eighteen are also in the Catalogue of the British Association. The catalogue places of these thirty-one stars are here annexed.

Comparison-Stars from British Association Catalogue.

N°.	N°. B. A. C.	Mag.	Year.	Mean place for beginning of year.		N°.	N°. B. A. C.	Mag.	Year.	Mean place for beginning of year.	
				α.	δ.					α.	δ.
				h. m. s.	° ′ ″					h. m. s.	° ′ ″
1	1562	7	1850	4 56 36.56	+26 13 12.1	64	2789	6	1852	8 11 43.71	+24 29 4.1
a	1648	6½	1850	5 11 34.46	27 47 58.4	*m*	2818	7	1852	8 17 51.24	25 0 54.8
b	1681	2	1850	5 16 48.79	28 28 32.6	*n*	2833	6½	1852	8 19 49.89	24 37 55.1
c	1707	7	1850	5 20 2.62	25 1 20.7	*o*	2850	6	1852	8 22 45.07	24 34 31.8
d	1754	7	1850	5 27 47.03	26 49 34.4	*p*	2864	7	1852	8 24 14.72	24 35 2.6
e	1778	6	1849	5 30 22.91	25 48 22.9	*q*	2937	4½	1852	8 34 42.94	21 59 52.6
12	1896	5½	1849	5 48 37.63	25 55 46.9	*r*	3017	7½	1852	8 45 27.01	20 31 24.1
f	1937	7	1850	5 54 56.05	25 26 36.0	109	3181	7½	1851	9 12 14.52	+19 43 1.8
g	1981	6	1949	6 2 16.64	24 26 50.8	118	5839	6½	1851	17 11 13.11	−17 35 42.5
21	2058	7	1849	6 15 25.51	25 7 16.5	125	5946	7	1850	17 28 47.02	27 57 18.1
35	2194	3	1849	6 34 38.46	25 16 30.2	130	6063	6½	1850	17 47 14.76	28 2 13.6
h	2555	2	1852	7 36 15.34	28 22 45.1	140	6194	5½	1850	18 8 39.99	27 5 29.8
i	2578	7	1852	7 39 42.35	23 30 14.8	143	6214	7	1850	18 11 54.29	26 8 28.0
k	2613	6½	1852	7 44 13.53	22 42 45.5	147	6261	7	1850	18 18 22.77	26 42 50.5
51	2639	6	1852	7 48 35.12	16 10 57.4	148	6301	7	1851	18 23 42.96	−19 4 24.2
l	2703	7	1852	7 57 49.33	+22 52 39.9						

Comparing these thirty-one declinations with the values here determined, and assuming the latter to be correct, we find—

The average discordance, $d = 4''.06$,

The mean error, $\varepsilon = \pm\, 6''.15$;

or, excluding those stars whose places depend upon Lacaille,

$$\varepsilon = \pm\, 3''.50.$$

Lacaille's positions have not been employed, inasmuch as, after careful examination, they seemed unlikely to add to the precision of the results.

The following General Catalogue of Comparison-Stars presents the adopted mean places for the beginning of the year of observation, together with the annual precessions and the constants for reduction to apparent places.

GENERAL CATALOGUE

OF

COMPARISON STARS.

General Catalogue of Comparison-Stars.

No.	Mag.	Year.	α.	Ann. Prec.	a.	b.	c.	d.
			h. m. s.	s.				
1	7.8	1850	4 56 37	+3.706	9.4834	0.0303	1.7449	9.1286
2	8	1850	5 3 5	3.712	9.4379	0.0338	1.7456	9.0840
3	9	1850	5 10 29	3.712	9.3779	0.0365	1.7456	9.0212
4	8.9	1850	5 17 48	3.725	9.3107	0.0406	1.7473	8.9593
5	9	1850	5 21 43	3.728	9.2689	0.0419	1.7476	8.9178
6	8	1849	5 22 32	3.731	9.2600	0.0426	1.7480	8.9106
7	9	1849	5 25 40	3.730	9.2219	0.0431	1.7478	8.8707
8	7	1849	5 29 33	3.733	9.1704	0.0444	1.7482	8.8203
9	9	1849	5 32 12	3.734	9.1311	0.0451	1.7482	8.7811
10	8½	1849	5 44 35	3.734	8.8752	0.0465	1.7482	8.5230
11	9	1849	5 46 15	3.736	8.8259	0.0472	1.7485	8.4746
12	5½	1849	5 48 38	3.721	8.7414	0.0456	1.7467	8.3821
13		1849	5 54 4	3.732	8.4604	0.0472	1.7480	8.1065
14	8.9	1849	5 54 28	3.734	8.4304	0.0475	1.7482	8.0776
15	8	1849	6 1 31	3.725	n7.8671	0.0465	1.7472	n7.5095
16	9	1849	6 2 22	3.724	n8.0603	0.0464	1.7471	n7.7023
17	8	1849	6 6 5	3.706	n8.4680	0.0439	1.7450	n8.1008
18	9½	1849	6 7 35	3.710	n8.5642	0.0444	1.7455	n8.1988
19	9	1849	6 9 26	3.711	n8.6592	0.0444	1.7456	n8.2945
20	9	1849	6 11 32	3.716	n8.7470	0.0449	1.7462	n8.3852
21	7	1849	6 15 26	3.697	n8.8711	0.0422	1.7440	n8.4990
22	9	1849	6 16 47	3.710	n8.9092	0.0437	1.7455	n8 5446
23	9	1849	6 17 59	3.710	n8.9386	0.0430	1.7454	n8.5719
24	9	1849	6 18 45	3.675	n8.9528	0.0390	1.7413	n8.5679
25	8½	1849	6 19 25	3.713	n8.9724	0.0437	1.7458	n8.6096
26	9	1849	6 21 2	3.700	n9.0057	0.0417	1.7442	n8.6355
27	9	1849	6 21 11	3.715	n9.0104	0.0437	1.7460	n8.6487
28	9	1849	6 21 36	3.707	n9.0182	0.0428	1.7452	n8.6525
29		1849	6 25 27	3.707	n9.0893	0.0420	1.7451	n8.7242
30	8.9	1849	6 25 44	3.692	n9.0922	0.0401	1.7434	n8.7187
31	9	1849	6 25 47	3.684	n9.0921	0.0391	1.7424	n8.7138
32	9	1849	6 27 21	3.678	n9.1171	0.0380	1.7417	n8.7356
33	9	1849	6 27 53	3.677	n9.1251	0.0378	1.7416	n8.7431
34	9	1849	6 28 46	3.689	n9.1401	0.0391	1.7430	n8.7654
35	3½	1849	6 34 38	3.696	n9.2214	0.0387	1.7438	n8.8517
36	9	1852	7 26 52	3.410	n9.5838	9.9836	1.7089	n9.0038
37	8.9	1852	7 29 28	3.413	n9.5963	9.9819	1.7092	n9.0208
38		1852	7 29 29	3.395	n9.5948	9.9804	1.7070	n8.9984
39	9.10	1852	7 30 38	3.400	n9.6006	9.9800	1.7076	n9.0105
40	8	1852	7 30 58	3.397	n9.6019	9.9795	1.7072	n9.0090
41	8	1852	7 32 44	3.417	n9.6116	9.9799	1.7097	n9.0432
42		1852	7 33 42	3.391	n9.6138	9.9768	1.7064	n9.0139
43	9	1852	7 33 49	3.419	n9.6167	9.9793	1.7100	n9.0524
44		1852	7 38 58	3.464	n9.6432	9.9797	1.7156	n9.1305
45	8	1852	7 41 52	3.613	n9.6732	9.9954	1.7340	n9.2852
46		1852	7 44 53	3.415	n9.6624	9.9700	1.7095	n9.1020
47		1852	7 46 36	3.623	n9.6936	9.9931	1.7351	n9.3154
48		1852	7 46 57	3.619	n9.6944	9.9923	1.7347	n9.3140
49	8	1852	7 47 6	3.630	n9.6966	9.9936	1.7360	n9.3233
50	7.8	1852	7 47 15	3.603	n9.6936	9.9899	1.7328	n9.3030
51	6	1852	7 48 35	3.417	n9.6768	9.9669	1.7097	n9.1219
52	9	1852	7 48 38	3.464	n9.7018	9.9916	1.7353	n9.3261
53		1852	7 50 53	3.588	n9.7055	9.9849	1.7310	n9.3076
54	9	1852	7 50 59	3.610	n9.7089	9.9878	1.7336	n9.3262
55	8	1852	7 52 38	3.605	n9.7143	9.9856	1.7329	n9.3289
56	9	1852	7 53 31	3.408	n9.6941	9.9615	1.7086	n9.1336
57	9	1852	7 55 3	3.619	n9.7251	9.9856	1.7346	n9.3511
58	8.9	1852	7 55 15	3.616	n9.7255	9.9850	1.7343	n9.3501
59	9	1852	7 59 15	3.561	n9.7320	9.9738	1.7276	n9.3211
60	9	1852	7 59 24	3.610	n9.7393	9.9805	1.7335	n9.3632
61		1852	8 5 27	3.401	n9.7337	9.9487	1.7076	n9.1759
62	9	1852	8 6 16	+3.598	n9.7609	9.9724	1.7321	n9.3833

General Catalogue of Comparison-Stars.

No.	δ.	Ann. Prec.	a′.	b′.	c′.	d′.	Weight.
	° ′ ″	″					
1	+26 13 6.03	+5.48	n8.5527	9.0815	0.7385	n9.9832	70
2	26 16 19.35	4.93	n8.6014	9.0366	0.6928	n9.9865	88
3	26 5 48.82	4.30	n8.6111	8.9745	0.6334	n9.9898	68
4	26 26 53.81	3.67	n8.6921	8.9113	0.5649	n9.9926	73
5	26 27 46.61	3.34	n8.7067	8.8698	0.5231	n9.9939	68
6	26 34 5.9	3.26	n8.7256	8.8621	0.5138	n9.9942	3
7	26 27 2.6	2.99	n8.7153	8.8227	0.4762	n9.9951	3
8	26 31 27.44	2.66	n8.7353	8.7720	0.4244	n9.9962	118
9	26 31 51.78	2.43	n8.7414	8.7328	0.3850	n9.9968	76
10	26 23 1.41	1.35	n8.7371	8.4752	0.1297	n9.9990	31
11	26 26 46.55	1.20	n8.7485	8.4266	0.0801	n9.9992	78
12	25 55 45.84	0.99	n8.6672	8.3360	9.9975	n9.9995	76
13	26 16 30.31	0.51	n8.7190	8.0522	9.7158	n9.9998	83
14	26 21 0.09	+0.48	n8.7392	8.0300	9.6850	n9.9999	76
15	26 2 16.10	−0.13	n8.6905	n7.4630	n9.1229	n0.0000	64
16	26 0 41.88	0.21	n8.6860	n7.6559	n9.3162	n0.0000	24
17	25 22 23.13	0.53	n8.5594	n8.0559	n9.7262	n9.9998	26
18	25 32 21.74	0.66	n8.5948	n8.1542	n9.8218	n9.9998	24
19	25 35 2.20	0.82	n8.6027	n8.2497	n9.9166	n9.9996	12
20	25 45 46.25	1.03	n8.6361	n8.3397	n0.0038	n9.9994	18
21	25 7 20.05	1.35	n8.4869	n8.4559	n0.1302	n9.9990	58
22	25 35 24.84	1.47	n8.5953	n8.4997	n0.1666	n9.9988	14
23	25 27 23.6	1.57	n8.5644	n8.5275	n0.1965	n9.9987	3
24	24 20 31.0	1.64	n8.1885	n8.5274	n0.2146	n9.9986	3
25	25 42 33.04	1.70	n8.6153	n8.5644	n0.2294	n9.9984	25
26	25 14 26.91	1.84	n8.5063	n8.5919	n0.2644	n9.9982	13
27	25 46 40.55	1.85	n8.6256	n8.6032	n0.2671	n9.9981	11
28	26 31 16.25	1.89	n8.5719	n8.6079	n0.2759	n9.9981	13
29	26 33 51.6	2.22	n8.5714	n8.6795	n0.3469	n9.9973	5
30	25 1 57.27	2.25	n8.4360	n8.6759	n0.3516	n9.9973	9
31	24 44 44.57	2.25	n8.3384	n8.6720	n0.3525	n9.9972	6
32	24 32 49.08	2.39	n8.2493	n8.6945	n0.3782	n9.9969	8
33	24 31 4.75	2.43	n8.2327	n8.7021	n0.3863	n9.9968	8
34	24 57 24.40	2.51	n8.4010	n8.7228	n0.3998	n9.9966	7
35	25 16 29.76	3.02	n8.4725	n8.8080	n0.4799	n9.9950	320
36	15 15 1.4	7.42	9.2413	n8.9882	n0.8705	n9.9680	3
37	15 24 42.2	7.63	9.2370	n9.0049	n0.8826	n9.9660	6
38	14 40 6.9	7.63	9.2687	n8.9840	n0.8827	n9.9660	3
39	14 53 36.6	7.73	9.2605	n8.9957	n0.8880	n9.9651	3
40	14 47 39.1	7.75	9.2650	n8.9944	n0.8895	n9.9648	3
41	15 40 22.0	7.90	9.2292	n9.0267	n0.8974	n9.9634	6
42	14 33 0.80	7.98	9.2777	n8.9998	n0.9019	n9.9626	7
43	15 49 51.1	7.98	9.2236	n9.0356	n0.9022	n9.9626	3
44	15 53 0.6	8.39	9.1274	n9.1090	n0.9240	n9.9582	1
45	24 9 12.70	8.62	8.4238	n9.2454	n0.9357	n9.9556	4
46	15 58 40.4	8.86	9.2311	n9.0850	n0.9475	n9.9528	1
47	24 44 50.72	9.00	8.3001	n9.2736	n0.9540	n9.9512	16
48	24 36 48.54	9.02	8.3528	n9.2726	n0.9552	n9.9509	16
49	25 3 2.69	9.04	8.1795	n9.2804	n0.9559	n9.9508	58
50	24 0 37.9	9.05	8.5219	n9.2637	n0.9565	n9.9506	3
51	16 10 52.60	9.15	9.2273	n9.1043	n0.9615	n9.9493	53
52	24 54 11.22	9.16	8.2780	n9.2838	n0.9616	n9.9493	31
53	23 34 50.1	9.33	8.6395	n9.2697	n0.9699	n9.9470	1
54	24 28 27.13	9.34	8.4518	n9.2853	n0.9702	n9.9470	18
55	24 18 58.67	9.47	8.5108	n9.2886	n0.9762	n9.9453	19
56	15 58 1.35	9.53	9.2435	n9.1165	n0.9793	n9.9444	6
57	25 0 20.89	9.65	8.3565	n9.3084	n0.9845	n9.9428	78
58	24 55 10.16	9.67	8.3871	n9.3077	n0.9853	n9.9426	67
59	22 50 45.4	9.97	8.7996	n9.2856	n0.9987	n9.9384	6
60	24 52 41.83	9.98	8.4594	n9.3210	n0.9992	n9.9382	18
61	16 4 20.7	10.44	9.2567	n9.1586	n1.0186	n9.9314	1
62	+24 47 0.20	−10.50	8.5661	n9.3413	n1.0212	n9.9305	33

General Catalogue of Comparison-Stars—Continued.

No.	Mag.	Year.	α.	Ann. Prec.	a.	b.	c.	d.
			h. m. s.	s.				
63	8	1852	8 10 14	+3.534	n9.7636	9.9584	1.7234	n9.3362
64	6.7	1852	8 11 44	3.583	n9.7762	9.9648	1.7303	n9.3937
65	9	1852	8 11 51	3.392	n9.7527	9.9408	1.7065	n9.1912
66		1852	8 13 10	3.581	n9.7804	9.9631	1.7301	n9.3980
67	8	1852	8 14 59	3.375	n9.7602	9.9354	1.7043	n9.1800
68	8	1852	8 16 8	3.575	n9.7886	9.9591	1.7294	n9.4050
69	8.9	1852	8 16 36	3.565	n9.7886	9.9572	1.7282	n9.3983
70	7	1852	8 19 29	3.507	n9.7889	9.9458	1.7210	n9.3556
71		1852	8 19 47	3.564	n9.7978	9.9535	1.7280	n9.4099
72		1852	8 19 50	3.567	n9.7986	9.9540	1.7284	n9.4134
73		1852	8 20 55	3.560	n9.8006	9.9517	1.7276	n9.4115
74		1852	8 21 44	3.498	n9.7941	9.9419	1.7199	n9.3552
75	7.8	1852	8 24 25	3.377	n9.7870	9.9241	1.7046	n9.2212
76	8.9	1852	8 26 59	3.381	n9.7943	9.9212	1.7052	n9.2378
77		1852	8 27 32	3.547	n9.8175	9.9422	1.7260	n9.4262
78		1852	8 28 3	3.538	n9.8174	9.9401	1.7248	n9.4194
79	9	1852	8 28 15	3.541	n9.8186	9.9404	1.7253	n9.4238
80		1852	8 30 12	3.530	n9.8224	9.9364	1.7239	n9.4214
81	8	1852	8 31 11	3.469	n9.8161	9.9264	1.7163	n9.3625
82		1852	8 31 41	3.525	n9.8255	9.9338	1.7233	n9.4222
83	9	1852	8 32 25	3.429	n9.8141	9.9196	1.7113	n9.3216
84	9	1852	8 32 36	3.434	n9.8152	9.9200	1.7119	n9.3280
85	8.9	1852	8 35 7	3.519	n9.8336	9.9286	1.7226	n9.4297
86	9	1852	8 39 25	3.417	n9.8300	9.9085	1.7098	n9.3336
87	9	1852	8 40 18	3.493	n9.8439	9.9189	1.7192	n9.4312
88	9	1852	8 44 15	3.491	n9.8520	9.9119	1.7190	n9.4360
89	8.9	1852	8 45 28	3.495	n9.8556	9.9109	1.7195	n9.4450
90	8	1852	8 45 58	3.484	n9.8552	9.9085	1.7182	n9.4358
91	8	1852	8 47 26	3.479	n9.8579	9.9057	1.7176	n9.4362
92	9	1852	8 47 33	3.477	n9.8579	9.9051	1.7173	n9.4342
93	8	1852	8 48 54	3.470	n9.8600	9 9020	1.7164	n9.4316
94	7.8	1852	8 50 26	3.464	n9.8626	9.8989	1.7157	n9.4312
95	8	1852	8 52 13	3.467	n9.8672	9.8967	1.7161	n9.4415
96	9	1852	8 53 47	3.456	n9.8689	9.8925	1.7146	n9.4343
97	7.8	1852	8 58 16	3.439	n9.8763	9.8829	1.7126	n9.4328
98	9	1852	8 59 27	3.445	n9.8797	9.8818	1.7133	n9.4436
99	8.9	1852	9 3 20	3.429	n9.8854	9.8728	1.7112	n9.4389
100	8.9	1852	9 3 20	3.430	n9.8856	9.8730	1.7114	n9.4405
101	8.9	1852	9 4 16	3.433	n9.8881	9.8719	1.7118	n9.4480
102	9	1851	9 4 23	3.421	n9.8864	9.8698	1.7102	n9.4332
103	9	1851	9 7 22	3.402	n9.8896	9.8617	1.7078	n9.4208
104		1851	9 7 37	3.417	n9.8924	9.8635	1.7097	n9.4406
105		1851	9 7 39	3.413	n9.8918	9.8628	1.7092	n9.4355
106	9	1851	9 8 11	3.401	n9.8911	9.8601	1.7077	n9.4225
107		1851	9 8 11	3.408	n9.8922	9.8612	1.7086	n9.4317
108	9	1851	9 10 18	3.401	n9.8953	9.8562	1.7077	n9.4303
109	7	1851	9 12 14	3.392	n9.8977	9.8513	1.7066	n9.4258
110		1850	16 40 55	3.699	n9.5774	n0.0217	1.7441	9.2265
111		1850	16 42 56	3.706	n9.5673	n0.0238	1.7449	9.2192
112		1850	16 49 12	3.717	n9.5326	n0.0286	1.7463	9.1877
113		1850	16 50 5	3.720	n9.5275	n0.0294	1.7466	9.1837
114		1850	16 51 59	3.724	n9.5161	n0.0308	1.7471	9.1735
115		1850	16 54 42	3.725	n9.4989	n0.0322	1.7473	9.1559
116		1850	16 59 44	3.735	n9.4658	n0.0357	1.7484	9.1257
117		1850	17 7 8	3.746	n9.4108	n0.0400	1.7497	9.0735
118	6½	1851	17 11 13	3.486	n9.3456	n0.0109	1.7184	8.8259
119		1850	17 12 50	3.763	n9.3638	n0.0442	1.7517	9.0333
120		1850	17 13 22	3.756	n9.3577	n0.0431	1.7508	9.0224
121		1850	17 13 51	3.764	n9.3544	n0.0445	1.7517	9.0237
122		1851	17 13 55	3.486	n9.3211	n0.0118	1.7184	8.8006
123		1851	17 21 18	3.492	n9.2465	n0.0148	1.7192	8.7291
124		1851	17 25 18	3.494	n9.1996	n0.0161	1.7194	8.6832
125	7	1850	17 28 45	+3.775	n9.1869	n0.0498	1.7530	8.8578

General Catalogue of Comparison-Stars—Continued.

No.	δ.	Ann. Prec.	a′.	b′.	c′.	d′.	Weight.
	° ′ ″	″					
63	+21 57 3.00	−10.79	8.9417	n9.3036	n1.0332	n9.9258	4
64	24 29 3.29	10.90	8.6729	n9.3528	n1.0376	n9.9239	413
65	15 55 48.5	10.91	9.2719	n9.1742	n1.0380	n9.9238	3
66	24 29 22.50	11.01	8.6849	n9.3570	n1 0417	n9.9222	20
67	15 44 33.5	11.14	9.3012	n9.1645	n1.0469	n9.9199	3
68	24 25 5.32	11.22	8.7207	n9.3643	n1.0502	n9.9184	29
69	24 1 31.99	11.26	8.7740	n9.3590	n1.0515	n9.9178	19
70	21 38 15.92	11.47	9.0037	n9.3239	n1.0594	n9.9140	4
71	24 9 40.5	14.49	8.7813	n9.3700	n1.0603	n9.9136	20
72	24 19 43.1	11.49	8.7617	n9.3730	n1.0604	n9.9136	15
73	24 5 30.9	11.57	8.7973	n9.3719	n1.0633	n9.9122	10
74	21 20 54.3	11.63	9.0316	n9.3244	n1.0655	n9.9110	1
75	15 46 20.15	11.82	9.2966	n9.2046	n1.0726	n9.9074	6
76	16 14 7.8	12.00	9.2888	n9.2204	n1.0792	n9.9038	3
77	23 58 5.5	12.04	8.8549	n9.3871	n1.0805	n9 9030	15
78	23 34 17.2	12.07	8.8944	n9.3815	n1.0818	n9.9023	15
79	23 45 37.97	12.09	8.8789	n9.3853	n1.0823	n9.9020	23
80	23 24 21.45	12.23	8.9210	n9.3842	n1.0874	n9.8991	20
81	20 36 12.24	12.29	9.1076	n9.3338	n1.0896	n9.8977	8
82	23 16 11.8	11.33	8.9597	n9.3853	n1.0909	n9.8970	15
83	18 46 14.60	11.38	9.1977	n9.2979	n1.0926	n9.8959	21
84	19 0 43.0	12.39	9.1878	n9.3037	n1.0930	n9.8956	3
85	23 14 31.64	12.56	8.9596	n9.3930	n1.0990	n9.8919	26
86	18 35 42.7	12.85	9.2214	n9.3104	n1.1090	n9.8852	3
87	22 44 42.07	12.91	9.0185	n9.3960	n1.1110	n9.8838	13
88	22 33 33.74	13.17	9.0472	n9.4014	n1.1197	n9.8774	23
89	22 51 37.98	13.26	9.0347	n9.4095	n1.1224	n9.8754	52
90	22 22 44.90	13.29	9.0648	n9.4018	n1.1234	n9.8745	28
91	22 15 16.45	13.38	9.0776	n9.4026	n1.1266	n9.8720	95
92	22 8 47.07	13.39	9.0838	n9.4009	n1.1268	n9.8718	28
93	21 54 57.81	13.48	9.1012	n9.3994	n1.1297	n9.8695	63
94	21 44 13.14	13.61	9.1157	n9.3992	n1.1328	n9.8669	69
95	22 2 29.25	13.69	9.1073	n9.4086	n1.1365	n9.8637	23
96	21 34 8 54	13.79	9.1357	n9.4028	n1.1396	n9.8610	28
97	21 6 22.86	14.08	9.1711	n9.4026	n1.1484	n9.8527	36
98	21 29 21.65	14.15	9.1588	n9.4123	n1.1507	n9.8505	28
99	20 57 21.40	14.39	9.1934	n9.4092	n1.1580	n9.8431	16
100	21 1 46.79	14.39	9.1904	n9.4106	n1.1580	n9.8431	32
101	21 16 51.22	14.44	9.1834	n9.4173	n1.1597	n9.8412	79
102	20 37 52.95	14.45	9.2092	n9.4045	n1.1599	n9.8410	20
103	19 51 45.7	14.63	9.2449	n9.3942	n1.1652	n9.8351	10
104	20 41 23.72	14.64	9.2164	n9.4116	n1.1657	n9.8346	13
105	20 27 59.92	14.66	9.2243	n9.4072	n1.1658	n9.8345	18
106	19 52 26.2	14.68	9.2467	n9.3958	n1.1667	n9.8334	10
107	20 15 48.64	14.68	9.2332	n9.4040	n1.1667	n9.8334	25
108	20 2 39.72	14.81	9.2466	n9.4032	n1.1704	n9.8290	25
109	+19 43 5 50	14.92	9.2624	n9.3996	n1.1737	n9.8250	41
110	−26 28 27.92	6.78	n8.4925	9.1784	n0.8315	9.9736	36
111	26 39 30.62	6.62	n8.5530	9.1704	n0.8207	9.9750	25
112	26 52 20.74	6.10	n8.6388	9.1381	n0.7852	9.9789	35
113	26 56 35.21	6.02	n8.6564	9.1338	n0.7799	9.9795	35
114	27 1 17.70	5.86	n8.6803	9.1233	n0.7682	9.9806	26
115	26 59 41.4	5.64	n8.6883	9.1058	n0.7511	9.9821	35
116	27 11 47.28	5.21	n8.7432	9.0748	n0.7171	9.9848	25
117	27 23 8.74	4.58	n8.7956	9.0219	n0.6614	9 9883	35
118	17 35 42.76	4.24	9.0728	8.8051	n0.6270	9.9901	69
119	27 50 52.92	4.10	n8.8668	8.9798	n0.6126	9.9907	30
120	27 31 24.64	4.05	n8.8310	8.9703	n0.6078	9.9910	35
121	27 49 2.65	4.01	n8.8676	8.9703	n0.6033	9.9911	10
122	17 33 8.88	4.01	9.0728	8.7798	n0.6027	9.9912	34
123	17 41 12.42	3.37	9.0567	8.7081	n0.5277	9.9938	12
124	17 43 32.68	3.02	9.0506	8.6620	n0.4807	9.9950	27
125	−27 56 57.38	−2.72	n8.9086	8.8040	n0.4353	9.9960	28

General Catalogue of Comparison-Stars—Continued.

No.	Mag.	Year.	α.	Ann. Prec.	a.	b.	c.	d.
			h. m. s.	s.				
126		1851	17 32 1	+3.503	n9.1074	n0.0185	1.7205	8.5974
127	7½	1851	17 38 44	3.505	n8.9888	n0 0200	1.7208	8.4798
128		1850	17 43 52	3.781	n8.9013	n0.0530	1.7537	8.5731
129		1851	17 46 23	3.512	n8.7961	n0.0217	1.7217	8.2920
130	6½	1850	17 47 14	3.783	n8.7999	n0.0535	1.7539	8.4720
131		1850	17 52 24	3.778	n8.5741	n0.0533	1.7534	8.2438
132		1850	17 53 28	3.777	n8.5082	n0.0532	1.7532	8.1773
133		1850	17 55 54	3.778	n8.3060	n0.0533	1.7533	7.9752
134		1850	17 59 6	3.773	n7.6925	n0.0527	1.7527	7.3592
135		1850	17 59 50	3.776	n6.9059	n0.0531	1.7531	6.5739
136		1850	18 4 7	3.786	8.2977	n0.0433	1.7443	n7.9266
137		1850	18 4 46	3.683	8.3702	n0.0521	1.7523	n8.0351
138		1850	18 6 40	3.717	8.5102	n0.0452	1.7462	n8.1481
139		1850	18 7 1	3.766	8.5847	n0.0526	1.7520	n8.2475
140	5	1850	18 8 40	3.755	8.6280	n0.0502	1.7507	n8.2864
141		1851	18 9 5	3.528	8.6259	n0.0236	1.7236	n8.1351
142		1850	18 9 30	3.723	8.6637	n0.0459	1.7470	n8.3053
143	7	1850	18 11 53	3.727	8.7620	n0.0463	1.7475	n8.4060
144		1851	18 12 37	3.528	8.7647	n0.0235	1.7237	n8.2746
145	8½	1850	18 13 1	3.737	8.8022	n0.0474	1.7486	n8.4514
146		1850	18 15 19	3.739	8.8731	n0.0475	1.7488	n8.5236
147	7	1850	18 18 23	3.743	8.9528	n0.0476	1.7493	n8.6056
148	7	1851	18 23 43	+3.532	9.0386	n0.0222	1.7241	n8.5529

General Catalogue of Comparison-Stars—Continued.

No.	δ.	Ann. Prec.	a′.	b′.	c′.	d′.	Weight.
	° ′ ″	″					
126	— 17 59 52.10	—2.44	9.0254	8.5756	n0.3879	9.9968	20
127	18 2 43.45	1.86	9.0177	8.4579	n0.2691	9.9981	59
128	28 0 54.48	1.41	n8.9314	8.5190	n0.1494	9.9989	25
129	18 15 28.10	1.19	8.9972	8.2696	n0 0759	9.9992	31
130	28 2 5.41	1.12	n8.9357	8.4178	n0.0479	9.9993	21
131	27 51 58.2	0.66	n8.9218	8.1902	n9.8228	9.9998	20
132	27 49 10.57	0.57	n8.9176	8.1239	n9.7571	9.9998	26
133	27 50 9.42	0.36	n8.9198	7.9218	n9.5548	9.9999	25
134	27 39 25.44	0.09	n8.9021	7.3065	n8.9421	0.0000	25
135	27 45 1.54	—0.01	n8.9116	6.5208	n8.1551	0.0000	25
136	25 10 53.16	+0.37	n8.5147	n7.8832	9.5566	9.9999	36
137	27 32 8.57	0.59	n8.8888	n7.9829	9.6202	9.9999	22
138	25 45 5.50	0.59	n8.6378	n8.1027	9.7671	9.9998	25
139	27 27 19.48	0.68	n8.8792	n8.1956	9.8341	9.9998	20
140	27 5 26.28	0.76	n8.8373	n8.2360	9.8798	9.9997	63
141	18 50 48.62	0.80	8.9439	n8.1112	9.9042	9.9997	36
142	25 59 9.6	0.83	n8.6783	n8.2590	9.9197	9.9996	15
143	26 8 42.83	1.04	n8.7033	n8.3593	0.0174	9.9994	23
144	18 55 16.26	1.10	8.9381	n8.2514	0.0428	9.9993	29
145	26 28 48.81	1.14	n8.7540	n8.4033	0.0563	9.9993	36
146	26 33 53.50	1.34	n8.7641	n8.4752	0.1269	9.9990	31
147	26 43 0.54	1.61	n8.7819	n8.5566	0.2060	9.9986	42
148	—19 4 23.99	+2.07	8.9299	n8.5284	0.3164	9.9977	57

Lastly, there is another class of stars to be examined; namely, those observed in connection with *Mars* upon the meridian at different places, and although not near enough to the planet to be treated as comparison stars, yet forming in fact the basis upon which the respective series of meridian observations must rest. The places of these stars have been reduced from the several authorities, together with those which were required for our General Catalogue, and the stars are referred to in the preceding special tables by index-letters instead of numbers.

The data employed for the determination of their adopted places are given below, and followed by the resultant list; the method of reduction and form of presentation being the same with that for the 148 stars of the catalogue proper.

To this class belong also *β Tauri* and *β Geminorum*, which being fundamental stars have been so thoroughly and frequently observed at Greenwich during the period of the *Mars* observations, that the places taken direct from the Greenwich Catalogue for 1850 seem more trustworthy than those derived from any combination of observations made at different epochs.

Places of Stars not used for comparison, but observed with the Cape Mural Circle, in connection with Mars I.

Name.	Date.	Observed.		Epoch.	Reduced to epoch in δ.	Mean δ at epoch.
		α.	δ.			
		h. m. s.	° ′ ″		″	° ′ ″
B.A.C. 1648	1849.—Dec. 30	5 11 35.48		1850.0		
	31		+27 47 51.68		+6.65	+27 47 58.33
	1850.—Jan. 3	35.25	54.83		6.50	48 1.33
	4		53.92		+6.45	48 0.37
						27 48 0.01
118 Tauri	1849.—Dec. 24	5 20 3.51	25 1 16.18	1850.0	+7.40	+25 1 23.58
	26		15.86		7.35	23.21
	29		17.96		7.27	25.23
	1850.—Jan. 10	3.52	19.46		6.95	26.41
	11		18.47		6.93	25.40
	12	3.66	18.44		6.91	25.35
	14		18.18		6.86	25.04
	15		18.12		6.83	24.95
	16		18 00		6.80	24.80
	17		19.07		+6.77	25.84
						25 1 24.98
B.A.C. 1754	1850.—Jan. 7	5 27 47.73	26 49 22.90	1850.0	+6.95	26 49 29.85
	8	47.85	23.07		6.92	29.99
	9	47.78	24.36		+6 88	31.24
						26 49 30.36
125 Tauri	1849.—Dec. 18	5 30 27.26	25 48 20.39	1849.0	+5.17	25 48 25.56
	20	27.25	19.22		5.12	24.34
	21		20.28		+5.09	25.37
						25 48 25.09
5 Geminorum	1849.—Nov. 25		+24 26 41.98	1849.0	+8.60	24 26 50.58
	26	6 2 20.69				
	27	20.40	43.92		+8.60	52.52
	1850.—Jan. 7	20.21				
						24 26 51.55

These determinations are given by Mr. Maclear in the Memoirs of the Royal Astronomical Society of London, volume XX, pp. 104, 5. They have been used with the regular micrometric comparison-stars, determined during the same period at the Cape, for obtaining the constant quantity which is to be subtracted from all the circle-measurements, both of planets and stars, at the Cape, in order to reduce the declinations to our adopted standard.

Declinations of Stars observed with the Cape Mural Circle, in connection with Mars II.

Name.	Date.	Observed δ.	Red to 1852.0.	Mean δ 1852.0.
		° ′ ″	″	° ′ ″
β Geminor.	1851.—Dec.22	+28 22 41.05	+4.08	+28 22 45.13
	26	41.89	4.07	45.96
	29	42.44	4.05	46.49
	30	42.06	4.04	46.10
	1852.—Jan. 1	42.47	4.02	46.49
	2	41.52	4.00	45.52
	3	42.70	3.98	46.68
	5	42.31	3.94	46.25
	9	44.02	3.84	47.86
	10	43.05	3.80	46.85
	12	43.84	3.73	47.57
	13	42.08	3.70	45.78
	14	43.70	3.66	
	15	44.11	3.63	47.74
	19	43.43	3.46	47 89
	20	43.70	3.41	47.11
	21	42.85	3.36	46.21
	22	42.45	3.30	45.75
	23	43.80	3.25	47.05
	24	43.46	3.20	
	27	44.35	3.03	47.38
	29	43.05	2.91	45.96
	Feb. 2	44.34	2.66	47.00
	3	44.16	2.60	46.76
	4	43.24	2.54	45.78
	5	44.14	2.47	46.61
	6	43.45	2.40	45.85
	7	43.65	2.34	45.99
	10	45.23	2.12	47.35
	11	45.19	2.05	47.24
	12	44.91	1.98	46.89
	13	43.63	1.91	45.54
	14	43.67	1.84	45.51
	16	45.12	1.70	46.82
	17	44.61	1.63	46.24
	18	44.21	1.56	45.77
	19	45.39	1.49	46.88
	25	45.63	1.04	46.67
	Feb.28	45.99	+0.81	46.80
				+28 22 46.53
B.A.C. 3017	Jan. 5	+20 31 21.59	+3.57	+20 31 25.16
32 υ⁴ C ncri	Jan.12	+24 35 1.64	+4.14	+24 35 5.78
	13	34 59 67	4.14	3.81
	14	35 1 39	4.15	5.54
	15	1.04	4.15	5.19
	16	0.66	4.14	4.80
	19	1.90	4.13	6.03
	20	1.87	4.12	5.99
	21	0.04	4.10	4.14
	22	2.66	4.09	6.75
	23	1.71	+4.08	5.79
				+24 35 5.38

Name.	Date.	Observed δ.	Red. to 1852.0.	Mean δ 1852.0.
		° ′ ″	″	° ′ ″
Lal. 17528	1852.—Jan.16	+22 46 33.34	+4.21	+22 46 37.55
30 υ³ Cancri	Jan.12	+24 34 32.32	+4.12	+24 34 36.44
	13	30.55	4.13	34.68
	14	32.70	4.13	36.83
	15	32.35	4.14	36.49
	16	31.93	4.14	36.07
	19	33.14	4.12	37.26
	20	33.07	4.10	37.17
	21	31.23	4.09	35.32
	22	33.45	4.07	37.52
	23	32.90	4.06	36.96
	Feb. 5	32.91	3.65	36.56
	7	32.83	+3.57	36.40
				+24 34 36 48
28 υ² Cancri	Feb. 3	+24 37 53.16	+3.69	+24 37 56.85
	4	53.31	3.66	56.97
	5	53.36	3.62	56.98
	6	53.64	3.58	57.22
	7	53.54	+3.53	57.07
				+24 37 57.02
24 υ² Cancri	Jan.24	+25 0 57.62	+3.97	+25 1 1.59
	26	57.44	3.91	1.35
	Feb.18	56.49	2.84	
	20	1 0.32	+2.71	
				+25 1 1.47
B.A.C. 2703	Jan.27	+22 52 37.12	+3.79	+22 52 40.91
	29	36.70	3.74	40.44
	Feb. 2	37.87	3.62	41.49
	9	37.48	3.50	40.98
	25	38.59	2.61	41.20
	28	38.59	+ 2.46	41.05
				+22 52 41.01
γ Cancri	Jan. 2	+21 59 46.77	+3.64	+21 59 50.41
	3	47.23	3.68	50.91
	5	47.51	3.76	51.27
	9	47.66	3.92	51.58
	10	46.08	3.95	50.03
	12	47.08	3.98	51.06
	13	45.72	3.99	49.71
	14	48.04	4.00	52.04
	15	47.58	+4.01	51.59
				+21 59 50.96
82 Geminor.	Feb.21	+23 30 8.09	+2.47	+23 30 10.56
	23	9.50	2.40	
	24	10.95	2.35	
	25	9.32	2.29	11.61
	28	8.71	+2.11	10.82
				+23 30 11.00
84 Geminor.	Feb.10	+22 42 38.06	+3.20	+22 42 41.26

Stars observed with Mars on the Meridian.

a

		h. m. s.	1850.0. ° ′ ″
Lalande 9944,5	(2.2)	5 11 34.48	+27 48 1.9
Piazzi V, 41	(6.7)	34.54	0.1
Taylor 1912	(4.4)	34.50	57.7
Greenwich 363	(3.5)	34.43	58.7
[46]		5 11 34	+27 47 58.78

b

		h. m. s.	1850.0. ° ′ ″
Greenwich 374	(97.78)	5 16 18.82	+28 28 30.77
[390]		5 16 19	+28 28 30.77

c

		h. m. s.	1850.0. ° ′ ″
Lalande 10231–3	(3.3)	5 20 2.39	+25 1 17 4
Piazzi V, 98	(15.16)	2.59	22.8
Taylor 1988	(6.5)	2.47	24.1
Bessel 405	(1.1)	2.57	24.8
Greenwich 381	(1.1)	2.54	22.9
[42]		5 20 3	+25 1 23.03

d

		h. m. s.	1850.0. ° ′ ″
Lalande 10510	(1.1)	5 27 47.04	+26 49 31.8
Bessel 405	(1.1)	46.85	34.6
Piazzi V, 145	(6.6)	46.69	29.6
Taylor 2045	(6.5)	46.86	29.1
Greenwich 395	(2.2)	46.91	30.7
[35]		5 27 47	+26 49 30.18

e

		h. m. s.	1849.0. ° ′ ″
Lalande 10605	(1.1)	5 30 22.42	+25 48 27.0
Piazzi V, 165	(7.8)	22.29	25.2
Taylor 2071	(5.5)	22.79	21.9
Bessel 405	(1.1)	22.89	27.3
Twelve-Year 478	(4.7)	22.94	23.8
Rümker 1499	(2.2)	22.61	23.8
Greenwich 402	(7.3)	22.84	24.6
[83]		5 30 23	+25 48 23.90

f

		h. m. s.	1850.0. ° ′ ″
Lalande 11441	(1.1)	5 54 55.35	+25 26 40.4
Piazzi V, 306	(5.6)	55.45	39.0
Rümker 1685	(16.10)	55.48	42.3
Taylor 2266	(4.5)	55.89	37.6
Greenwich 440	(2.2)	55.74	37.7
[62]		5 54 55	+25 26 40.06

g

		h. m. s.	1849.0. ° ′ ″
Piazzi V, 350	(9.9)	6 2 16.45	+24 26 53.3
Taylor 2335	(10.9)	16.51	52.1
Bessel 348	(1.1)	16.67	49.6
Rümker 1744	(1.1)	16.15	(59.2)
Greenwich 452	(4.3)	16.67	51.7
[54]		6 2 16	+24 26 52.06

h

		h. m. s.	1852.0. ° ′ ″
Greenwich 571	(153,98)	7 36 15.31	+28 22 45.43
[490]		7 36 15	+28 22 45.43

i

		h. m. s.	1852.0. ° ′ ″
Lalande 15146	(1.1)	7 39 42.27	+23 30 8.6
Piazzi VII, 207	(6.7)	42.08	7.8
Bessel 339	(1.1)	42.24	9.4
Taylor 3222	(8.6)	42.50	10.9
Twelve-Year 698	(3.7)	42.21	8.8
Greenwich 573	(8.7)	42.38	9.5
[99]		7 39 42	+23 30 9.38

k

		h. m. s.	1852.0. ° ′ ″
Lalande 15312–4	(3.3)	7 44 13.31	+22 42 34.0
Piazzi VII, 232	(4.4)	13.42	39.5
Bessel 339	(1.1)	13.27	35.6
Taylor 3272	(3.4)	13.52	(42.5)
Greenwich 578	(4.4)	13.24	37.0
[30]		7 44 13	+22 42 36.87

l

		h. m. s.	1852.0. ° ′ ″
Lalande 15795	(1.1)	7 57 50.51	+22 52 39.4
Piazzi VII, 299	(9.9)	50.44	40.2
Bessel 339	(1.1)	49.92	39.7
Taylor 3402	(4.4)	49.59	38.7
Greenwich 593	(6.5)	49.85	39.6
[50]		7 57 50	+22 52 39.48

m

		h. m. s.	1852.0. ° ′ ″
Lalande 16517–9	(3.3)	8 17 51.24	+25 1 6.0
Piazzi VIII, 65 *pr.*	(6.7)	51.49	1.8
Bessel 341,344	(2.2)	51.31	59.6
Struve 994	(6.6)	51.36	0.7
Taylor 3575	(6.7)	51.33	0 59.5
Rümker 2516	(2.2)		1 2.5
Greenwich 613 pr.	(4.4)	51.15	0 59.6
[123]		8 17 51	+25 1 0.54

n

		h. m. s.	1852.0. ° ′ ″
Lalande 16597–9	(3.3)	8 19 49.53	+24 37 58.0
Piazzi VIII, 76	(15.14)	49.73	56.8
Taylor 3594	(9.5)	50.09	57.9
Greenwich 617	(4.4)	49.82	55.5
[52]		8 19 50	+24 37 56.69

o

		h. m. s.	1852.0. ° ′ ″
Lalande 16685–7	(2.2)	8 22 45.41	+24 34 35.8
Piazzi VIII, 84	(24.22)	45.25	36.4
Bessel 344	(1.1)	44.90	34.9
Taylor 3617	(4.4)	45.32	34.0
Rümker 2545	(1.1)		36.0
Greenwich 619	(3.2)	44.97	34.5
[52]		8 22 45	+24 34 35.35

Stars observed with Mars on the Meridian—Continued.

p		h. m. s.	1852.0. ° ′ ″
Lalande 16763	(1.1)	8 24 15.21	+ 24 35 6.8
Piazzi VIII, 89	(5.6)	14.99	3.4
Bessel 344	(1.1)	14.94	4.7
Taylor 3635	(3.4)	14.85	4.2
Greenwich 623	(6.8)	14.71	4.3
	[62]	8 24 15	+ 24 35 4.24

r		h. m. s.	1852.0. ° ′ ″
Lalande 17514,5	(2.2)	8 45 26.96	+ 20 31 21.5
Piazzi VIII, 195	(6.6)	27.36	21.3
Taylor 3861	(3.4)	27.10	23.1
	[20]	8 45 27	+ 20 31 22.55

q		h. m. s.	1852.0. ° ′ ″
Lalande 17143-6	(4.4)	8 34 44.10	+ 21 59 53.4
Piazzi VIII, 142	(32.15)	43.15	49.4
Taylor 3739	(21.13)	43.06	48.5
Rümker 2624	(6.5)		48.9
Twelve-Year 775	(9.8)	42.91	49.7
Greenwich 637	(23.23)	42.88	49.0
	[228]	3 34 43	+ 21 59 49.13

s		h. m. s.	1852.0. ° ′ ″
Lalande 17528,9	(2.2)	8 45 45.38	+ 26 46 (46.5)
Bessel 278, 344, 5	(3.3)	4 . 7	40.7
Maclear	(.1)		36.2
Greenwich 641	(4.3)	44.90	5.3
	[29]	8 45 45	+ 22 46 37.11

The star *s* presents indications of a decided proper-motion, affecting the determination of the declination. We find—

S

	Observed.	Reduced.	Computed.	C—O.
	° ′ ″	″	″	″
Lalande . .	+ 22 46 49.5	46.50	46.46	— 0.04
Bessel . . .	40.20	40.67	40.70	+ 0.03
Maclear . .	37.55	36.22	35.82	— 0.40
Greenwich .	35.34	35.28	34.40	+ 0.12

So that, although the mean by weights is 22° 46′ 37″.11, if we reject Lalande, as is then unavoidable, we may yet obtain accordant and satisfactory results by adopting the declination + 22° 46′ 35″.63, with a proper-motion of — 0″.194. This has been done.

Adopted Declinations of Mars-Culminating Stars.

No.	Name.	Mag.	Year.	Approx. α.	Ann. Prec.	δ.	Ann. Prec.	a'.	b'.	c'.	d'.	Weight.
				h. m. s.	s	° ′ ″						
a	B.A.C. 1648 .	6½	1850.0	5 11 34	3.76	+27 47 58.78	+4.21	*n*8.8584	8.9904	0.6239	*n*9.9902	46
b	β Tauri . .	2	1850.0	5 16 19	3.78	28 28 30.77	+3.76	*n*8.9385	8.9509	0.5748	*n*9.9922	390
c	118 Tauri* .	7	1850.0	5 20 3	3.69	25 1 22.96	+3.48	*n*8.3678	8.8655	0.5414	*n*9.9934	42
d	B.A.C. 1754 .	7	1850.0	5 27 47	3.74	26 49 30.18	+2.81	*n*8.7752	8.8010	0.4488	*n*9.9957	35
e	125 Tauri . .	6	1849.0	5 30 23	3.71	25 48 23.90	+2.58	*n*8.6132	8.7490	0.4124	*n*9.9964	83
f	B.A.C. 1937 .	7	1850.0	5 54 55	3.71	25 26 40.06	+0.44	*n*8.5763	7.9784	9.6476	*n*9.9999	62
g	5 Geminorum	6	1849.0	6 2 16	3.68	24 26 52.06	—0.20	*n*8.2739	*n*7.6139	*n*9.2993	*n*0.0000	54
h	β Geminorum	1½	1852.0	7 36 15	3.73	28 22 45.43	—8.18	*n*8.7176	*n*9.2874	*n*0.9126	*n*9.9605	490
i	82 Geminorum	7	1852.0	7 39 42	3.60	23 30 9.38	—8.45	8.5597	*n*9.2255	*n*0.9270	*n*9.9575	101
k	84 Geminorum	6½	1852.0	7 44 13	3.57	22 42 36.87	—8.81	8.7278	*n*9.2294	*n*0.9450	*n*9.9534	32
l	B.A.C. 2703 .	7	1852.0	7 57 50	3.56	22 52 39.48	—9.86	8.7874	*n*9.2814	*n*0.9940	*n*9.9399	52
m	24 v^1 Cancri .	7	1852.0	8 17 51	3.58	25 1 0.54	—11.35	8.6493	*n*9.3789	*n*1 0550	*n*9.9162	121
n	28 v^2 Cancri .	6½	1852.0	8 19 50	3.57	24 37 56.69	—11.49	8.7232	*n*9.3781	*n*1.0604	*n*9.9136	52
o	30 v^3 Cancri .	6	1852.0	8 22 45	3.57	24 34 35.77	—11.70	8.7546	*n*9.3849	*n*1.0682	*u*9.9097	54
p	32 v^4 Cancri .	7	1852.0	8 24 15	3.56	24 35 4.24	—11.81	8.7657	*n*9.3890	*n*1.0721	*n*9.9076	64
q	γ Cancri . .	4½	1852.0	8 34 43	3.49	21 59 49.13	—12.53	9.0412	*n*9.3694	*n*1.0981	*n*9.8925	228
r	B A.C. 3107 .	7½	1852.0	8 45 27	3.45	20 31 22.55	—13.25	9.1562	*n*9.3649	*n*1.1223	*n*9.8754	20
s	H. C. 17528.9	7½	1852.0	8 45 45	3.49	22 46 35.63	—13.27	9.0407	*n*9.4086	*n*1.1230	*n*9.8749	29

c, 118 Tauri, as one mass.

§ 6. OBSERVATIONS.

The observations have, in almost every case, been reduced anew, as far as the data permitted, and the results are given in detail. The right-ascensions are given where space conveniently allows: both the observed and, in a subsequent section, the computed values. Although only approximately required for our purpose, it seems well to append them to the other results when no obstacle exists, both on account of completeness and for convenience of use. The observations for each planet and each series are naturally grouped together, and the results of each group considered by themselves.

The positions of the comparison-stars constitute a first requisite, and the observations for each series are preceded by a table of apparent places, containing for every star employed the dates on which it was used, the reductions from mean to apparent places, and the resulting apparent declinations.

I. FIRST SERIES OF OBSERVATIONS OF MARS.

Apparent Places of Stars compared with Mars during the first Series of Observations.

No.	Date.	Reduction in		Apparent	
		α.	δ.	α.	δ.
		s.	″	h. m. s.	° ′ ″
1	1850.—Jan 7	+0.74	−6.17	4 56 38	+26 12 59.9
	12	0.72	6.02	56 38	13 0.0
	17	0.69	5.89	56 38	0.1
2	Jan. 10	+0.75	−6.26	5 3 5	+26 16 13.1
	14	0.73	6.13	3 5	13.2
	18	0.71	6.02	3 5	13.3
3	Jan. 19	+0.64	−6.23	5 10 30	+26 5 42.6
	25	0.57	6.06	10 30	42.8
	31	0.43	5.88	10 29	42.9
4	Jan. 3	+0.78	−6.87	5 17 49	+26 26 46.9
	6	0.78	6.77	17 49	47.0
	9	0.78	6.66	17 49	47.2
5	1849.—Dec. 29	+0.77	−7.16	5 21 43	+26 27 39.5
	31	0.78	7.09	21 43	39.5
	1850.—Jan. 2	0.80	7.01	21 43	39.6
6	1849.—Dec. 27	+4 49	−3.97	5 22 36	+26 34 1.9
	31	4.51	3.83	22 37	2.1
7	Dec. 26	+4.48	−4.37	5 25 44	+26 26 58.2
	28	4.49	4.30	25 44	58.3
	30	4.50	4.23	25 45	58.4
8	Dec. 20	+4.44	−5.02	5 29 37	+26 31 22.4
	24	4.47	4.87	29 37	22.6
	28	4.50	4.74	29 38	22.7
9	Dec. 19	+4.42	−5.32	5 32 16	+26 31 46.5
	24	4.47	5.17	32 16	46.6
	29	4.51	5.00	32 17	46 8
10	Dec. 10	+4.29	−6.89	5 44 39	+26 22 54.5
	14	4.34	6.80	44 39	54.6
	18	4.39	6.73	44 39	54.7
11	Dec. 14	+4.35	−7.01	5 46 19	+26 26 39.5
	16	4.38	6.95	46 19	39 6
	18	4.41	9.90	46 19	39.7
12	Dec. 8	+4.23	−7.35	5 48 32	+25 55 38.5
	10	4.27	7.32	48 32	38.5

No.	Date.	Reduction in		Apparent	
		α.	δ.	α.	δ.
		s.	″	h. m. s.	° ′ ″
13	1849.—Dec. 9	+4.25	−7.92	5 54 8	+26 16 22.4
	11	4.28	7.89	54 8	22.4
14	Dec. 11	+4.28	7.94	5 54 32	+26 20 52.2
	13	4.32	7.90	54 32	52.2
15	Dec. 3	+4.12	−8.73	6 1 35	+26 2 7.4
	6	4.17	8.71	1 35	7.4
	9	4.22	8.67	1 35	7.4
16	Dec. 4	+4.13	−8.81	6 2 26	+26 0 33.1
	8	4.20	8.77	2 26	33.1
17	Nov. 22	+3.83	−9 09	6 6 9	+25 22 14.0
	26	3.92	9.10	6 9	14.0
18	Nov. 24	+3.87	−9.27	6 7 39	+25 32 12.5
	28	3.96	9.28	7 39	12.5
19	Nov. 23	+3.84	−9.44	6 9 30	+25 34 53.3
	27	3.94	9.46	9 30	53.2
20	Nov. 28	+3.96	−9.68	6 11 36	+25 45 36.6
	Dec. 1	4.02	9.69	11 36	36.6
21	Nov. 19	+3.70	−9.84	6 15 30	+25 7 10.2
	23	3.80	9 89	16 30	10.2
22	Nov. 24	+3.83	−10.11	6 16 51	+25 35 14.7
	28	3.93	10.14	16 51	14.7
23	Nov. 22	+3.78	−10.19	6 18 3	+25 27 13.4
	26	3.87	10.22	18 3	13.4
24	Oct. 31	+3.13	−9.55	6 18 48	+24 20 21.4
	Nov. 4	3.24	9.64	18 48	21.4
25	Nov. 25	+3.85	−10.38	6 19 29	+25 42 22.7
	Dec. 1	3.99	10.43	19 29	22.6
26	Nov. 19	+3.67	−10.35	6 21 6	+25 14 16.6
	23	3.78	10.42	21 6	16.5
27	Nov. 30	+3.96	−10.60	6 21 15	+25 46 30.0
	Dec. 4	4.05	10.62	21 15	29.9
28	Nov. 22	+3.76	−10.50	6 21 40	+25 31 5.8
		3.86	10.57	21 40	5.7

Apparent places of Stars—Continued.

No.	Date.	Reduction in α.	Reduction in δ.	Apparent. α.	Apparent. δ.	No.	Date.	Reduction in α.	Reduction in δ.	Apparent. α.	Apparent. δ.
		s.	″	h. m. s.	° ′ ″			s.	″	h. m. s.	° ′ ″
29	1849.—Dec. 27	+4.49	—10.89	6 25 31	+26 33 40.7	33	1849.—Nov. 2	+3.13	—10.30	6 27 56	+24 30 54.5
	31	4.54	10.84	25 32	40.8		8	3.31	10.47	27 56	54.3
30	Nov. 13	+3.48	—10.60	6 25 47	+25 1 46.7						
	18	3.62	10.71	25 48	46.6	34	Nov. 12	+3.43	—10.77	6 28 49	+24 57 13.6
31	Nov. 10	+3.39	—10.44	6 25 50	+24 44 34.1		17	3.57	10.91	28 50	13.5
	15	3.53	10.56	25 51	34.0						
32	Nov. 2	+3.14	—10.27	6 27 24	+24 32 38.8	35	Nov. 19	+3.61	—11.51	6 34 42	+25 16 18.3
	6	3.26	10.40	27 24	38.7		24	3.75	11.63	34 42	18.1

A.—OBSERVATIONS OF MARS I, WITH THE SANTIAGO EQUATORIAL.

In the reduction of these observations the following errors were assumed in the printed copy:

Pages 3, 4, 5, December 11, $\Delta\delta$ should be negative throughout, and the signs in Col. Micr. reversed, excepting No. 31.
4, " an error of one revolution assumed in No. 27.
6, " 12, Nos. 13, 25, 26, 33, reverse the signs in Col. Micr.

	"		"	25, Micr.,	*for*	0.08	*read*	1 08.
8,	"	13,	"	38, Micr.,	"	9.24	"	5.24.
			"	64, $\Delta\delta$	"	3.15	"	3.05.
11,	"	15,	"	32,	"	4.55	"	4.59.
			"	40,	"	5.46	"	5.52.
13,	"	16,	"	16,	"	1.72	"	1.82.
14,	"		"	48,	"	1.77	"	1.71.
15,	"		"	67,	"	.79	"	6.79.
23,	"	21,	"	8,	"	2.78	"	2.76.
24,	"	22,	"	20,	"	0.35	"	1.35.
			"	48,	"	1.25	"	1.15.
26,	"	23,	"	54,	"	0.46	"	0.54.
38,	"	30,	"	38,	"	6.33	"	6.36.
50,	January	7,	"	34,	"	10.46	"	10.86.
53,	"	9,	"	12,	"	18.16	"	18.26.
			"	14,	"	17.32	"	17.33.
60,	"	14,	"	20,	"	2.05	"	2.15.
			"	46,	"	1.25	"	1.35.
69,	"	20,	"	24,	"	12.92	"	12.72.
74,	"	24,	"	12,	"	3.35	"	3.25.
79,	"	27,	"	30,	"	1.79	"	1.69.

These necessarily introduce changes into the table of "Results," and from these and other sources slight errors have arisen, which have been corrected in the present computation, as indicated below. The numbers of the lines as cited are counted from the beginnings of the several printed tables of Results.

Page 3, lines 1, 2, *for* Eight *read* Nine.
5, in Col. Rev. reverse the sign.

	line 4,	*for*	9.039 = 2′ 56″17	*read*	9.150 = 2′ 58″.33
	" 15,	"	0.965 = 18.81	"	1.076 = 20.97
	" 18,	"	16.86		19.02
8,	" 2,	"	2.719 = 0 52.99	"	2.713 = 0 52.88
13,	" 3,	"	4.286 = 1 23.53	"	4.307 = 1 23.90
16,	" 2,	"	1.650 = 0 32.16	"	1.606 = 0 31.30
17,	" 6,	"	1.030 = 20.25	"	0.995 = 19.39
	" 9,	"	17.99	"	17.13
23,	" 2,	"	2.757 = 0 53.73	"	2.750 = 0 53.60
	" 6	"	1.087 = 21.18	"	1.080 = 21.05
	" 9,	"	19.22	"	19.09
25,	" 1,	"	1.361 = 0 26.53	"	1.352 = 0 26.36
	" 6,	"	1.039 = 20.25	"	1.030 = 20.08
	" 9,	"	18.16	"	17.99
26,	" 1,	"	0.471 = 0 9.18	"	0.476 = 0 9.28
	" 6,	"	0.994 = 19.35	"	0.996 = 19.45
	" 9,	"	17.21	"	17.31
31,	" 1,	"	0 18.91	"	0 18.86
	" 2,	"	0.016 = 0 0.31	"	0. 20 = 0 0.40
	" 6,	"	0.986 = 19.22	"	0. 87 = 19.26
	" 9,	"	17.02	"	17.06
36,	" 1,	"	0.055 = 0 1.07	"	0.061 = 0 1.18
37,	" 6,	"	1.027 = 20.02	"	1.021 = 19.91
	" 9,	"	17.78	"	17.67
39,	" 2,	"	6.399 = 2 4.71	"	6.401 = 2 4.75
	" 6,	"	19.75	"	19.71
	" 9,	"	17.48	"	17.44
51,	" 1,	"	10.848 = 3 31.03	"	10.877 = 3 31.99
	" 2,	"	3 51.24	"	3 51.64
	" 6,	"	1.037 = 20.21	"	1.008 = 19.65
	" 9,	"	18.01	"	17.45
54,	" 1,	"	17.323 = 5 37.62	"	17.324 = 5 37.64
	" 2,	"	18.314 = 5 56.93	"	18.324 = 5 57.13
	" 6,	"	0.991 = 19.31	"	1.000 = 19.49
	" 9,	"	16.71	"	16.89
56,	" 1,	"	2 29.58	"	2 29.60
57,	" 6,	"	18.77	"	18.75
61,	" 1,	"	1.216 = 0 23.70	"	1.224 = 0 23.86
	" 2,	"	2.165 = 0 42.20	"	2.173 = 0 42.35
66,	" 1,	"	3 25.33	"	3 25.27
69,	" 2,	"	12.772 = 4 8.93	"	12.738 = 4 8.27
	" 6,	"	0.815 = 15.88	"	0.849 = 16.54
	" 9,	"	13.47	"	14.13
75,	" 2,	"	3.177 = 1 1.92	"	3.168 = 1 1.75
	" 6,	"	0.836 = 16.29	"	0.845 = 16.46
	" 9,	"	13.86	"	14.03
79,	" 1,	"	1.627 = 0 31.71	"	1.618 = 0 31.54
	" 6,	"	14.72	"	14.89
	" 9,	"	— 12.22	"	12.39
84,	" 2,	"	7.989 = 2 35.70	"	8.041 = 2 36.72
	" 6,	"	0.754 = 14.69	"	0.805 = 15.71
	" 9,	"	12.42	"	13.44

The introduction of these modifications furnishes the following table of observations, as they have been employed for the purposes of the present discussion :

MARS I.

Observations with the Santiago Equatorial.

Date.	Obs. part.	Sant. S.T.	Wash. M.T.	$t-T$.	Star No.	Star's δ.	Meas. $D\delta$.	Refr.	Obs'd δ.	No. of Comp. N.	No. of Comp. S.
		h. m. s.	h. m. s.	d.		° ′ ″	′ ″		° ′ ″		
1849.—Dec. 10	N. S.	6 7 30.68	12 22 21.69	—20.48447	13	+26 16 22.40	—0 14.90	0.02	+26 16 7.48	9	8
11	N. S.	4 4 41.15	10 15 56.37	19.57226	14	20 52.15	—2 52.12	0.22	17 59.81	2	3
	N. S.	4 57 52.42	11 8 58.93	19.53543	14	20 52.15	—2 47.84	0.19	18 4.12	9	9
	N. S.	6 2 27.52	12 13 23.44	19.49070	14	20 52.15	—2 41.08	0.18	18 10.89	5	4
12	N. S.	3 45 40.36	9 53 2.78	18.58816	14	20 52.17	—0 55.14	0.07	19 56.96	3	2
	N. S.	4 33 52.53	10 41 7.05	18.55478	14	20 52.17	—0 48.04	0.05	20 4.08	4	4
13	N. S.	5 44 32.98	11 47 40.01	17.50856	14	20 52.19	+1 3.38	0.06	21 55.63	17	16
14	N. S.	5 22 0.11	11 21 14.93	16.52691	11	26 39.54	—3 5.91	0.20	23 33.43	14	13
15	N. S.	4 3 20.25	9 58 52.04	15.58412	11	26 39.57	—1 42.17	0.13	24 57.27	8	9
	N. S.	5 48 56.38	11 44 10.87	15.51099	11	26 39.57	—1 34.17	0.10	25 5.30	14	14
16	N. S.	3 59 48.05	9 51 24.51	14.58930	11	26 39.60	—0 21.53	0.03	26 18.04	35	34
17	N. S.	5 6 31.16	10 54 0.78	13.54582	11	26 39.63	+ 53.05	0.06	27 32.74	23	22
18	N. S.	4 37 18.94	10 20 57.43	12.56878	11	26 39.65	+1 52.41	0.13	28 32 19	13	12
20	N. S.	4 38 42.11	10 14 28.55	10.57328	8	31 22.42	—1 15.88	0.08	30 6.46	7	7
	N. S.	6 47 44.78	12 23 10.08	10.48391	8	31 22.42	—1 10.70	0.08	30 11.64	4	4
21	N. S.	4 27 52.11	9 59 44.42	9.58351	8	31 22.46	—0 43.08	0.05	30 39.33	3	3
22	N. S.	5 13 39.03	10 41 27.92	8.55454	8	31 22.50	—0 16.15	0.02	31 6.13	12	12
23	N. S.	4 44 23.25	10 8 21.03	7.57753	8	31 22.54	—0 0.30	0.00	31 22.24	15	15
24	N. S.	5 1 30.58	10 21 29.64	6.56841	8	31 22.57	+0 8.53	0.01	31 31.11	20	20
25	N. S.	5 1 32.01	10 17 35.16	5.57112	8	31 22.61	+0 9.33	0.01	31 31.95	20	24
26	N. S.	5 6 38.60	10 18 45.00	4.57031	8	31 22.64	+0 2.53	0.00	31 25.17	30	30
27	N. S.	5 24 41.28	10 32 48.81	3.56055	8	31 22.67	—0 11.11	0.01	31 11.55	19	20
30	N. S.	4 40 45.67	9 37 12.66	—0.59906	5	27 39.48	+2 14.71	0.15	29 54.34	16	15
31	N. S.	4 55 12.18	9 47 40.89	+0.40811	5	27 39.52	+1 38.77	0.11	29 18.41	18	18
1850.—Jan. 1	N. S.	4 51 23.94	9 39 57.37	1.40275	5	27 39.56	+0 54.31	0.06	28 33.93	23	22
2	N. S.	4 59 8.35	9 43 44.60	2.40538	5	27 39.66	+0 8.08	0.01	27 47.75	18	18
4	N. S.	5 11 25.28	9 48 7.99	4.40843	4	26 46.99	—0 44.86	0.05	26 2.08	25	25
6	N. S.	4 17 11.49	8 46 10.96	6.36540	4	26 47.04	—2 38.70	0.17	24 8.17	6	6
	N. S.	5 54 57.53	10 23 40.99	6.43311	4	26 47.04	—2 42.26	0.18	24 4.60	3	2
7	N. S.	5 6 42.04	9 31 37.49	7.39696	4	26 47.09	—3 41.69	0.24	23 5.16	14	13
8	N. S.	5 12 55.47	9 33 53.99	8.39854	4	26 47.10	—4 44.15	0.31	22 2.64	10	10
9	N. S.	5 6 23.99	9 23 27.67	9.39129	4	26 47.15	—5 47.25	0.37	20 59.53	10	10
10	N. S.	5 30 34.80	9 43 38.61	10.40531	2	16 13.09	+3 42.94	0.24	19 56.27	9	9
11	N. S.	5 18 3.82	9 27 13.77	11.39391	2	16 13.13	+2 39.08	0.17	18 52.38	9	9
12	N. S.	5 10 26.38	9 15 41.66	12.38590	2	16 13.16	+1 34.40	0.10	17 47.66	10	10
13	N. S.	5 1 16.00	9 2 36.88	13.37682	2	16 13.19	+0 30.73	0.03	16 43.95	9	9
14	N. S.	5 20 13.40	9 17 35.26	14.38721	2	16 13.22	—0 32.97	0.04	15 40.21	12	12
15	N. S.	5 17 24.21	9 10 50.62	15.38253	2	16 13.25	—1 35.25	0.10	14 37.90	11	11
	N. S.	6 35 14.69	10 28 28.35	15.43644	2	16 13.25	—1 37.06	0.11	16 36.08	1	1
16	N. S.	5 20 11.67	9 9 41.72	16.38173	2	16 13.28	—2 35.33	0.17	13 37.78	13	13
17	N. S.	5 22 7.53	9 7 41.35	17.38034	2	16 13.30	—3 34.61	0.23	12 38.46	15	15
18	N. S.	5 25 43.74	9 7 21.06	18.38010	2	16 13.33	—4 31.77	0.29	11 41.27	12	12
19	N. S.	4 59 16.72	8 37 2.47	19.35906	3	5 42.59	+5 10.48	0.33	10 53.40	1	1
20	N. S.	4 56 59.78	8 30 49.98	20.35474	3	5 42.62	+4 16.54	0.27	9 59.43	6	6
21	N. S.	5 18 58.35	8 48 49.05	21.36724	3	5 42.65	+3 26.01	0.22	9 8.88	9	9
22	N. S.	5 26 8.50	8 52 2.11	22.36947	3	5 42.68	+2 37.24	0.17	8 20.09	12	12
23	N. S.	5 4 44.45	8 26 45.65	23.35192	3	5 42.71	+1 52.54	0.12	7 35.37	6	6
	N. S.	6 24 50.69	9 46 38.77	23.40739	3	5 42.71	+1 51.67	0.13	7 34.51	3	3
24	N. S.	5 40 17.24	8 58 16.71	24.37380	3	5 42.74	+1 10.06	0.07	6 52.87	11	11
25	N. S.	5 30 54.17	8 44 59.27	25.36458	3	5 42.76	+0 31.51	0.02	6 14.30	11	11
26	N. S.	5 36 34.66	8 46 42.92	26.36577	3	5 42.78	—0 5.48	0.00	5 37.30	9	9
27	N. S.	5 15 38.37	8 21 54.15	27.34854	3	5 42.82	—0 38.99	0.04	5 3.79	11	9
28	N. S.	5 40 9.22	8 42 25.08	28.36279	3	5 42.86	—1 11.65	0.07	4 31.14	11	12
29	N. S.	5 24 30.34	8 22 52.85	29.34922	3	5 42.90	—1 39.03	0.10	4 3.77	11	11
31	N. S.	5 35 13.23	8 25 42.17	+31.35118	3	+26 5 42.94	—2 28.86	0.16	+26 3 13.92	13	13

B.—OBSERVATIONS OF MARS I, WITH THE WASHINGTON EQUATORIAL.

The following corrections and changes have been made in the series of Washington observations as given in this volume:

Page 351, November 2, Nos. 4, 5. This comparison is excluded.
352, " 4, No. 38, *for* Mars N. F. *read* Mars N.
353, Remarks. There is no reference to indicate the comparison alluded to.
359, November 24, No. 29, Mean of wires, *for* 4*h*.55*m*.29*s*.00 *read* 4*h*.56*m*.29*s*.00.
359, Remarks. Nos. 15 and 19 are included in the mean of the declinations.
361, " 26, No. 74, *for* 1.795 *read* 1.792.
363, December 6, " 17, " 4*h*.10*m*.38*s*. 10 *read* 4*h*.10*m*.37*s*. 10.
" 27, " 2 23.503 *read* 2 33.503.
364, Comparisons Nos. 56 to 70 are excluded, as evidently containing some source of error not detected.
364, December 6, No. 68, *for* 2 37.498 *read* 2 27.498.
365, " 11, Mars N. P., *for* 6 *read* 5.
366, " 12, No. 27, *for* 3.398 *read* 3.388.
368, " 17, Comparison No. 60 is excluded from the mean.
369, " 27, Nos. 16, 17, 20, *for* 1.080, 2.061, 2.074 *read* 1.088, 2.060, 2.064.
371, " 31, Comparison No. 21 is excluded from the mean.
373, January 5, No. 26, *for* 8.609 *read* 8.069.
Comparison No. 33 is excluded from the mean.

The results of this series of observations will then be as follows, so far as they pertain to the measurements of declinations:

Washington Observations of Mars during the opposition of 1849–50.

Date.	Star.	Chron. time.	Chron. corr.	Limb.	$\Delta\delta$ Rev.	$\Delta\delta$ Arc.	No. Comp.
		h. m. s.	s.			′ ″	
1849.—Nov. 2	B. Z. 348.84	5 29 50.74	+ 43.83	S.	+ 0.324	4.98	3
		5 10 5.14	43.81	N.	+ 1.681	25.84	3
4	B. Z. 348.95	4 20 37.09	49.40	N.	—20.247	5 11.23	5
		4 18 13.06	49.42	S.	—21.736	5 34.12	5
		5 23 35.02	49.46	N.	—19.877	5 5.54	7
				S.	—21.083	5 24.08	7
6	B. Z. 348.95	4 17 34.45	54.47	N.	+ 0.320	4.92	8
				S.	— 1.129	17.35	8
12	Lal. 12557	4 39 45.41	1 5.12	N.	+14.828	3 47.93	19
				S.	+13.020	3 20.14	19
		6 7 40.32	1 5.24	N.	+15.504	3 58.32	6
				S.	+13.858	3 33.02	6
13	Lal. 12557	3 55 40.23	1 6.96	N.	+26.243	6 43.40	15
				S.	+24.834	6 21.74	15
24	B. Z. 523.106	4 22 45.71	1 27.40	S.	+ 2.104	32.34	5
		4 27 48.33	1 27.40	N.	+ 3.407	52.37	5
26	Lal. 12237	4 36 16.78	1 32.34	N.	— 1.021	15.69	29
				S.	— 2.453	37.71	29
		6 43 53.78	1 32.55	N.	+ 0.286	4.40	11
				S.	— 1.175	18.06	11
Dec. 6	Lal. 11714	5 9 34.32	1 53.21	S.	+20.451	5 14.37	13
		5 11 49.06	1 53.21	N.	+21.853	5 35.91	11
	Lal. 11684	4 44 48.40	1 53.21	S.	+14.301	3 39.83	9
		4 54 41.88	1 53.21	N.	+15.754	4 2.17	8
11	Rümker 1673	3 37 45.02	2 3.72	S.	+ 4.802	1 13.81	6
		3 48 33.08	2 3.72	N.	+ 6.357	1 37.72	5
12	Rümker 1680	4 27 9.06	2 6.42	S.	— 5.140	1 19.01	8
		4 32 51.73	2 6.42	N.	— 3.638	55.92	7
17	B. Z. 405.56	4 18 44.53	2 19.18	N.	+ 2.991	45.98	16
		4 31 51.35	+2 19.20	S.	+ 1.717	26.39	22

Washington Observations of Mars during the opposition of 1849–50—Continued.

Date.	Star.	Chron. time.	Chron. corr.	Limb.	Δδ Rev.	Δδ Arc.	No. Comp.
		h. m. s.	m. s.			′ ″	
27	B. Z. 405.28	3 56 0.24	+2 34.48	S.	− 2.347	36.08	22
		3 55 41.88	2 34.48	N.	− 1.114	17.68	20
31	B. Z. 405.15	4 6 27.96	2 46.40	S.	+ 4.451	1 8.42	13
		4 9 25.92	+2 46.40	N.	+ 6.036	1 32.78	12
1850.—Jan. 5	B. Z. 523.15	4 2 38.35	−1 3.10	S.	− 8.097	2 4.46	13
		4 25 48.43	1 3.08	N.	− 6.782	1 44.25	12
9	B. Z. 523.15	3 54 39.60	54.20	S.	−23.644	6 3.44	7
		4 1 16.39	54.20	N.	−22.638	5 47.98	7
12	B. Z. 396.4	3 40 55.25	45.67	S.	+ 4.824	1 14.15	8
		3 42 30.36	45.67	N.	+ 5.922	1 31.04	6
14	B. Z. 396.4	4 26 35.37	37.94	S.	− 3.577	54.98	2
		4 34 25.12	37.93	N.	− 2.329	35.80	2
22	B. Z. 405.6	4 13 11.25	21.22	S.	+ 8.924	2 17.17	11
		4 18 27.31	21.22	N.	+ 9.894	2 32.08	10
29	B. Z. 405.6	3 14 13.52	19.86	S.	− 7.765	1 59.36	3
		3 20 14.31	− 19.86	N.	− 6.654	1 42.28	3

We thus obtain a series of observations which, when arranged like those at Santiago, give the annexed table:

MARS I.

Observations with the Washington Equatorial.

Date.	Obs. part.	Wash. S. T.	Wash. M. T.	$t-T$.	Star No.	Star's δ.	Meas. Dδ.	Refr.	Obs'd δ.	No. Comp. N.	No. Comp. S.
		h. m. s.	h. m. s.	d.		° ′ ″	′ ″		° ′ ″		
1849.—Nov. 2	N. S.	5 20 44.34	14 30 56.64	−58.39518	24	+24 20 21.40	+0 15.41	0.00	+24 20 36.81	3	3
4	N. S.	4 15 24.50	13 17 55.68	56.44588	33	24 30 54.39	−5 22.68	0.10	24 25 31.61	5	5
	N. S.	5 24 24.48	14 26 44.36	56.39810	33	24 30 54.39	−5 14.81	0.09	24 25 39.49	7	7
6	N. S.	4 18 28.92	13 13 7.78	54.44922	33	24 30 54.33	− 6.21	0.00	24 30 48.12	8	8
12	N. S.	4 40 50.53	13 11 50.28	48.45011	31	24 44 34.08	+3 34.06	0.06	24 48 8.20	19	19
	N. S.	6 8 45.56	14 39 30.91	48.38922	31	24 44 34.08	+3 45.70	0.06	24 48 19.84	6	6
13	N. S.	3 56 47.19	12 23 58.25	47.48335	31	24 44 34.06	+6 32.56	0.12	24 51 6.74	15	15
24	N. S.	4 26 44.42	12 10 35.56	36.49264	23	25 27 13.40	+ 42.36	0.00	25 27 55.76	5	5
26	N. S.	4 37 49.12	12 13 46.63	34.49043	22	25 35 14.71	− 26.62	0.00	25 34 48.09	29	29
	N. S.	6 45 26.33	14 21 2.93	34.40205	22	25 35 14.71	− 6.81	0.00	25 35 7.90	11	11
Dec. 6	N. S.	4 51 38.35	11 48 14.49	24.50817	15	26 2 7.39	+3 51.06	0.07	26 5 58.52	8	9
	N. S.	5 12 34.90	12 9 7.60	24.49366	16	26 0 33.09	+5 25.14	0.10	26 5 58.33	11	13
11	N. S.	3 50 12.77	10 27 19.42	19.56436	13	26 16 22.42	+1 25.77	0.00	26 17 48.19	5	6
12	N. S.	4 32 6.82	11 5 10.69	18.53807	14	26 20 52.67	−1 7.47	0.02	26 19 44.68	7	8
17	N. S.	4 27 37.13	10 41 2.19	13.55484	11	26 26 39.62	+ 36.31	0.02	26 27 15.95	16	21
27	N. S.	3 58 25.54	9 32 36.26	− 3.60236	8	26 31 22.67	− 26.82	0.00	26 30 55.85	20	22
31	N. S.	4 10 43.34	9 29 8.40	+ 0.39524	5	26 27 39.52	+1 20.64	0.02	26 29 0.18	12	12
1850.—Jan. 5	N. S.	4 13 10.30	9 11 55.41	5.38328	4	26 26 47.00	−1 54.22	0.04	26 24 52.74	12	12
9	N. S.	3 57 3.80	8 40 7.90	9.36120	4	26 26 47.15	−5 55.63	0.10	26 20 51.42	7	7
12	N. S.	3 40 57.14	8 12 16.15	12.34185	2	26 16 13.15	+1 22.65	0.02	26 17 35.82	6	8
14	N. S.	4 29 52.31	8 53 11.48	14.37027	2	26 16 13.22	− 45.28	0.02	26 15 27.92	2	2
22	N. S.	4 15 28.06	8 7 22.31	22.33845	3	26 5 42.68	+2 24.63	0.04	26 8 7.35	10	11
29	N. S.	3 16 54.06	6 36 26.54	+29.27531	3	+26 5 42.88	−1 50.82	0.04	+26 3 52.02	3	3

C.—OBSERVATIONS OF MARS I, WITH THE GREENWICH EQUATORIAL.

MARS I.

Observations with the Greenwich equatorial.

Date.	Obs. part.	Green. S. T.	Wash. M. T.	$t-T$.	Star No.	Star's δ.	Meas. $D\delta$.	Refr.	Obs'd δ.	No. Comp. N.	No. Comp. S.
		h. m. s.	h. m. s.	d.		° ′ ″	′ ″		° ′ ″		
1849.—Nov. 26	N. S.	0 28 32.0	2 57 48.64	—34.87652	22	25 35 14.71	—1 47.72	0.15	25 33 26.84	2	2
30	N. S.	6 1 13.5	8 13 52.00	30.65704	20	25 45 36.56	+1 47.87	0.04	25 47 24.47	2	2
Dec. 8	C.	2 44 40	4 26 23.4	22.81501		26 5	+5 20.47	0.13	26 10	5	
15	C.	5 8 15	6 32 1.9	15.72776	11	26 26 39.57	—2 11.77	0.04	26 24 27.76	4	
27	C.	0 51 10	1 18 29.7	— 3.94549	8	26 31 22.67	— 24.07	0.04	26 30 58.56	6	
1850.—Jan. 4	N. S.	4 20 15.5	4 15 33.7	+ 4.17748	4	26 26 46.97	— 46.22	0.02	26 26 0.73	3	3
5	N. S.	2 42 41.75	2 34 20.0	5.10717	4	26 26 47.00	—1 40.02	0.05	26 25 6.93	5	3
7	C.	3 23 46	3 7 25.7	+ 7.13016	4	26 26 47.04	—3 39.32	0.08	26 23 7.64	3	

D.—OBSERVATIONS OF MARS I, WITH THE GREENWICH MURAL CIRCLE.

MARS I.

Observations with the Greenwich Mural Circle.

Date.	Obs. part.	Green. S. T.	Wash. M. T.	$t-T$.	Circle reading.	Refr.	Zenith.	Obs'd δ.	Semid.
							° ′ 93.32		
		h. m. s.	h. m. s.	d.	° ′ ″	″	″	° ′ ″	″
1849.—Nov. 1	C.	6 25 25.76	10 32 1.7	— 59.56109	120 42 53.53	29.80	38.69	+ 24 17 53.56	
6	C.	6 26 47.50	10 13 43.7	54.57380	120 30 21.33	30.35	40.22	24 30 26.74	
16	C.	6 24 54.52	9 32 31.9	44.60241	120 0 21.70	29.82	37.01	25 0 23.69	
30	N.	6 11 45.71	8 24 22.5	30.64974	119 13 2.50	28.32	36.35	25 47 33.16	10.57
Dec. 4	N.	6 6 2.49	8 2 56.6	26.66462	119 0 38.80	28.47	32.79	25 59 53.74	9.98
8	N.	5 59 40.97	7 40 52.4	22.67995	118 49 50.82	27.72	32.54	26 10 42.14	10.06
15	N.	5 47 37.74	7 1 19.8	15.70741	118 36 5.22	27.23	31.87	26 24 27.24	10.38
17	N.	5 44 6.64	6 49 57.5	13.71531	118 33 32.53	27.28	31.87	26 27 2.06	8.20
19	N.	5 40 37.36	6 38 36.9	11.72318	118 31 35.47	28.07	33.78	26 28 58.54	9.90
27	N.	5 27 30.51	5 54 4.9	3.75411	118 29 38.97	27.36	35.94	26 30 58.89	8.92
28	N.	5 26 1.22	5 48 40.0	2.75787	118 29 58.83	28.16	35.94	26 30 38.02	9.13
29	N.	5 24 34.38	5 43 17.5	— 1.76160	118 30 23.61	27.58	35.94	26 30 13.10	9.85
							° ′ 83.31		
1850.—Jan. 4	N.	5 16 52.14	5 12 1.0	+ 4.21668	29.42	27.23	23.93	26 25 55.32	8.47
5	N.	5 15 45.92	5 6 59.0	5.21318	23.68	27.66	23.93	26 24 59.94	9.16
7	N.	5 13 43.91	4 57 5.6	7.20632	21.82	28.61	23.96	26 23 0.94	9.10
23	N.	5 6 2.63	3 46 31.0	23.15730	54.43	28.64	21.37	26 7 28.23	6.58
30	N.	5 7 20.55	3 20 17.3	30.13909	53.52	28.91	22.90	26 3 29.74	7.24
Feb. 6	N.	5 11 6.50	2 56 31.3	37.12258	1.97	27.47	32.22	26 1 33.33	5.96
7	N.	5 11 49.75	2 53 18.5	38.12035	7.77	27.82	32.22	26 1 25.15	7.99
9	N.	5 13 24.15	2 47 0.8	40.11598	20.27	27.56	31.89	26 1 13.78	6.79
13	S.	5 17 2.85	2 34 55.3	44.10758	28.78	28.85	33.42	26 1 5.91	6.39
16	N.	5 20 11.09	2 26 15.3	47.10156	25.71	28.36	32.90	26 1 10.14	5.14
21	C.	5 26 8.24	2 12 31.9	52.09204	21.35	27.86	32.17	26 1 19.47	
22	C.	5 27 25.10	2 9 52.7	+ 53.09019	20.20	28.09	32.06	26 1 20.28	

E.—OBSERVATIONS OF MARS I, WITH THE CAPE EQUATORIAL.

The changes made are contained in the following table, which comprises some conjectural emendations, as well as more evident errors of reduction or observation:

Page 467, line 4, the declination of Lalande 11946, the comparison star of November 25, 26, seems to be correct, but the right ascension given is 1*m*. too great.

471,	November 21,	No. 5,	Arc $\Delta\delta$,	*for* 22′ 21″.54	*read* 23′ 21″.54.	
472,	“ 25,	“ 2,		“ 13 22.93	“ 13 4.16	
		“ 5,		“ 13 9.90	“ 13 2.86	
		“ 8,		“ 13 4.68	“ 13 2.34	
		“ 11,		“ 13 0.77	“ 13 1.95	

The comparison stars are Lalande 11946 and 11976, 8.
The app. declination of the latter should read 25° 35′ 4″.

473,	November 27,	No. 5,	Arc $\Delta\delta$	*for* 17′ 11″.43	*read* 17′ 22″.43.	
		“ 6,		“ 12 38.75	“ 12 48.75	
474,	“ 28,	“ 1,	Clock	“ 5*h*. 26*m*. 13*s*.	“ 5*h*. 24*m*. 13*s*.	
		“ 3,		“ 5 30 40	“ 5 31 40	
		“ 5,		“ 5 39 33	“ 5 38 33	
475,	“ 29,	“ 8,	Arc $\Delta\delta$	“ 15′ 26″.01	“ 15′ 27″.44	
		“ 9,		“ 13 46.39	“ 13 6.50	
475,	December 30,	“ 3,	Clock	“ 5*h*. 24*m*. 40*s*.	“ 5*h*. 23*m*. 40*s*.	
475,	“ 1,	“ 1,	Arc $\Delta\delta$	“ 8′ 23″.86	“ 8′ 43″.86	
476,	“ 1,	“ 9,		“ 8 57.03	“ 8 42.95	
477,	“ 4,	“ 2,		“ 15 22.12	“ 15 28.12	
		“ 8,		“ 15 41.37	“ 15 41.57	
		“ 10,		“ 13 27.40	“ 15 27.40	
478,	“ 7,	“ 6,		“ 7 0.76	“ 7 1.02	
		“ 10,		“ 6 59.04	“ 6 59.27	
479,	“ 8,	“ 5,		“ 21 51.57	“ 21 51.86	
		“ 7,		“ 21 51.80	“ 21 52.09	
		“ 9,		“ 21 52.84	“ 21 53.13	
479,	“ 9,	“ 1,	Hour-circle	“ 12*h*. 58*m*. 20*s*.	“ 11*h*. 58*m*. 20*s*.	
		“ 2,	Clock	“ 6 56 36	“ 5 56 36	
		“ 3,	Arc $\Delta\delta$	“ 7′ 29″.56	“ 11′ 50″.26	
480,	“ 9,	“ 9,		“ 7 26.51	“ 11 47.21	
		“ 12,		“ 7 25.00	“ 11 45.69	
480,	“ 10,	“ 13,	Hour-circle	“ 12*h*. 44*m*. 9*s*.	“ 12*h*. 54*m*. 9*s*.	
484,	“ 18,	“ 1,	Arc $\Delta\delta$	“ 18′ 39″.38	“ 18′ 36″.38	
	“ 21,	“ 2,	Clock	“ 6*h*. 15*m*. 54*s*.	“ 6*h*. 14*m*. 54*s*.	
		“ 4,		“ 6 23 30	“ 6 29 30	
485,	“ 21,	“ 5 to 8,	Hour-circle	“ 12	“ 13	
485,	“ 22,	“ 3,	Arc $\Delta\delta$	“ 12′ 28″.92	“ 12′ 27″.25	
		“ 7,		“ 12 40.03	“ 13 40.03	
		“ 8,		“ 12 55.31	“ 13 55.31	
485,	“ 23,	“ 1,		“ 12 58.61	“ 12 58.87	
487,	“ 26,	“ 14,		“ 13 4.69	“ 13 4.58	
		“ 17,		“ 13 13.01	“ 13 15.01	
		“ 18,		“ 13 2.87	“ 13 2.76	
488,	“ 26,	“ 37,		“ 13 18.63	“ 13 18.14	

487, 8, “ 26, “ 8. The planet seems to have been compared throughout with two stars, and ten times with each star. One of these is Lalande 10669, as given in the first five comparisons for each limb; the other comparisons on page 488 being the last five for each limb with the other star, which is No. 8 of our General Catalogue.

489,	January 8,	“ 5,	Arc $\Delta\delta$	*for* 18′ 14″.91	*read* 18′ 32″.74
		“ 6,		“ 13 29.24	“ 9 8.55
		“ 7,		“ 18 16.89	“ 18 34.72
		“ 8,		“ 13 45.87	“ 9 25.18

Page 489, January	8,	No. 9,	Arc Δδ	*for*	18′ 35″. 81	*read*	18′ 36″. 81
		" 10,		"	13 34. 51	"	9 13. 81
		" 12,		"	13 53. 17	"	9 32. 48
490, "	9,	" 6,		"	9 49. 45	"	9 31. 20
		" 8,		"	9 48. 16	"	9 30. 00
		" 10,		"	9 50. 85	"	9 32. 69
491, "	14,	" 2,		"	11 28. 21	"	11 29. 01
		" 6,		"	11 28. 71	"	11 29. 51
492, "	17,	" 9,		"	13 42. 48	"	13 42. 74
		" 11,		"	13 42. 17	"	13 42. 43
		" 13,		"	13 42. 38	"	13 42. 64

The reductions in the *Monthly Notices* R.A.S. X, p. 156 having proved very useful in these computations, a few corrigenda to the series as there given are appended:

November 21,	Cape S. T.,	*for*	7*h.* 47*m.* 45*s.* 74	*read*	5*h.* 47*m.* 45*s.* 74.
" 25,	Name	"	H. C. 11946?	"	H. C. 11946
" 25,	"	"	Anon.	"	Lalande 11976, 8
" 26,	"	"	H. C. 11946?	"	H. C. 11946
December 2,	No. of Obs.	"	6	"	4
" 25,	Excess	"	— 0′ 14″. 143	"	— 0′ 14″. 643
" 26,	Excess	"	— 0 5. 387	"	+ 0 5. 387

After introducing these emendations, we obtain detailed results of observations as follows:

Micrometer-Observations of Mars at the Cape of Good Hope during the opposition of 1849–50.

Date.	Limb.	No.	Hour circle.	Clock.	*	Δδ.	
						Micr.	Arc.
			h. m. s.	*h. m. s.*		*r.*	′ ″
1849.—Nov. 21	N.	2	6 1 25	6 1 37	B. A. C. 2058	+23.468	10 11.80
	S.	2	5 33 56	5 34 12.5		+22.774	9 53.70
	N.	2	6 1 25	6 1 37	ε Geminor.	+ 2.437	1 3.54
	S.	2	5 33 56	5 34 12.5		+ 1.672	0 43.59
22	N.	2	7 4 10	7 4 18		+10.672	4 38.22
	S.	2	7 21 47	7 21 56		+10.182	4 25.42
24	N.	2	6 42 22		Lal. 11854	+12.712	5 31.42
	S.	2	6 21 48			+11.940	5 11.26
25	N.	3	6 10 47		Lal. 11946	— 2.544	1 6.32
	S.	3	6 26 3			— 3.048	1 19.45
	N.	3	6 10 47		Lal. 11976,8	— 8.711	3 47.08
	S.	3	6 26 3			— 9.206	3 59.92
26	N.	3	6 47 3		Lal. 11946	— 5.560	2 24.95
	S.	3	7 0 11			— 5.013	2 10.68
	N.	1	6 47 3		Lal. 11976,8	+ 0.455	11.83
	S.	2	7 0 11			+ 1.184	30.88
27	N.	7	6 0 44	6 1 13	Lal. 12336	+10.352	4 29.87
	S.	7	6 7 43	6 7 56		+10.969	4 45.96
28	N.	6	5 58 44	5 58 56		+ 2.652	1 9.13
	S.	6	6 5 36	6 5 44		+ 3.228	1 24.17
29	N.	3	6 51 11	6 51 24		— 5.277	2 17.56
	S.	3	6 59 42	6 59 56		— 4.717	2 2.97
30	N.	2	5 23 7	5 23 20		—12.346	5 21.86
	S.	2	5 33 9	5 33 19		—11.766	5 6.72
Dec. 1	N.	3	6 2 58	6 3 10	Lal. 12395	—10.393	4 30.94
	S.	2	6 2 36	6 2 49		— 9.758	4 14.38
2	N.	2	7 16 32	7 16 38		—17.962	7 48.26
	S.	2	7 33 33	7 33 39		—17.469	7 35.41
3	N.	3	6 2 18		Lal. 11684	+11.385	7 56.80
	S.	3	6 11 9			+11.947	5 11.44

Micrometer-Observations of Mars at the Cape of Good Hope—Continued.

Date.	Limb.	N°.	Hour-Circle.	Clock.	*	Δδ. Micr.	Δδ. Arc.
			h. m. s.	h. m. s.		r.	′ ″
1849.—Dec. 4	N.	4	5 58 5	5 58 16	Lal. 11684	+ 4.537	1 58.28
	S.	4	6 5 1	6 5 22		+ 5.080	2 12.43
5	N.	5	5 49 18		"	− 2.031	52.93
	S.	5	5 54 59			− 1.452	37.84
6	N.	5	5 44 25	5 44 35	"	− 8.359	3 37.92
	S.	5	5 47 45	5 47 55		− 7.822	3 23.80
	N.	4	6 34 49	6 35 0		− 8.579	3 43.64
	S.	5	6 34 48	6 35 0		− 8.004	3 28.67
7	N.	5	5 25 22		"	−14.497	6 17.91
	S.	5	5 27 55			−13.867	6 1.49
	N.	5	6 8 20			+14.726	6 23.88
	S.	5	6 11 8			+14.071	6 6.86
8	N.	5	5 50 58		"	+20.311	8 49.50
	S.	5	5 53 46			+19.749	8 34.80
	N.	5	5 32 48			−20.556	8 55.94
	S.	5	6 35 53			−19.975	8 40.73
9	N.	2	6 13 20	6 13 31	139 Tauri	+40.879	17 45.69
	S.	2	6 29 45	6 29 54		+40.384	17 32.79
	N.	2	6 13 20	6 13 31	Lal. 11684	+26.024	11 18.44
	S.	1	6 29 45	6 29 54		+25.494	11 4.61
10	N.	2	6 50 9	6 50 12	Lal. 11108	−16 426	7 8.20
	S.	2	7 5 51	7 5 57		−16.976	7 22.54
	N.	2	7 57 27	7 57 30		+16.162	7 1.34
	S.	2	8 15 23	8 15 24		+16.711	7 15.64
11	N.	2	6 20 49	6 20 41	"	+11.630	5 3.17
	S.	1	6 32 16	6 32 22		+12.228	5 18.78
14	N.	5	5 48 9	5 48 15	"	− 0.978	25.49
	S.	5	5 56 35	5 56 44		− 0.388	10.12
15	N.	5	5 29 23		"	− 4.419	1 55.20
	S.	5	5 34 39			− 3.853	1 40.45
16	N.	5	5 26 52		"	− 7.699	3 20.71
	S.	5	5 30 9			− 7.002	3 2.53
	N.	5	6 3 56			− 7.654	3 19.53
	S.	5	6 3 56			− 6.994	3 2.33
	N.	5	6 28 44			+ 7.788	3 22.97
	S.	5	6 28 44			+ 7.150	3 6.44
17	N.	5	6 8 8		"	−12.436	5 24.21
	S.	5	6 10 49			−11.876	5 9.60
	N.	5	6 41 40			+ 8.485	3 41.19
	S.	5	6 43 52			+ 7.917	3 26.38
18	N.	5	5 47 0		"	+12.858	5 35.19
	S.	5	5 50 41			+12.313	5 20.98
	N.	5	6 33 49	6 33 54		−12.840	5 34.73
	S.	5	6 37 35	6 37 39		−12.337	5 21.61
20	N.	2	5 25 25	5 25 33	Lal. 10669	− 3.766	1 38.18
	S.	2	5 33 51	5 33 59		− 4.432	1 55.53
	N.	2	6 4 6	6 4 10		+ 3.798	1 39.02
	S.	2	6 13 7	6 13 12		+ 4.360	1 53.65
21	N.	2	6 15 43	6 15 43	"	+ 2.472	1 4.43
	S.	2	6 22 11	6 22 12		+ 3.046	1 19.41
	N.	2	6 46 7	6 46 11		− 2.359	1 1.49
	S.	2	6 52 55	6 52 57		− 2.982	1 17.74
22	N.	2	5 59 39	5 59 16	"	− 1.326	34.57
	S.	2	6 4 33	6 4 41		− 1.931	50.31
	N.	2	6 25 27	6 25 32		+ 1.474	38.43
	S.	2	6 30 11	6 30 18		+ 2.039	53.16

Micrometer-Observations of Mars at the Cape of Good Hope—Continued.

Date.	Limb.	N°.	Hour-Circle.	Clock.	*	Δδ Micr.	Δδ Arc.
			h. m. s.	h. m. s.		r.	′ ″
1849.—Dec. 23	N.	1	5 28 1	5 28 1	Lal. 10669	+ 0.726	0 18.93
	S.	1	5 31 29	5 31 29		+ 1.248	32.53
25	N.	5	5 7 4	5 7 17	"	+ 0.252	6.56
	S.	5	5 9 30	5 9 52		+ 0.832	21.69
	N.	5	5 37 20	5 37 28		+ 0.262	6.86
	S.	5	5 39 53	5 40 1		+ 0.860	22.43
26	N.	5	4 44 15		"	+ 0.468	12.19
	S.	5	4 49 36		Gen. Cat. N°. 8	+ 1.039	27.06
	N.	5	5 33 6			— 0.492	12.82
	S.	5	5 35 5			+ 0.079	2.06
29	N.	3	5 26 55	5 27 2	Lal. 10669	+ 2.643	1 8.91
	S.	2	5 27 22	5 27 26		+ 3.220	1 23.94
30	N.	1			"	+ 3.827	1 39.77
1850.—Jan. 7	N.	2	5 33 47	5 34 12	B. A. C. 1562	—23.990	10 25.40
	S.	2	5 55 21	5 55 26		—23.436	10 10.94
8	N.	1	4 46 53	4 47 0	B. A. C. 1562	—14.390	8 15.13
	S.	1	5 2 54	5 3 2		—13.789	7 58.47
	N.	2	5 48 52	5 48 58		—21.619	9 23.60
	S.	2	6 9 13	6 9 20		—21.060	9 9.02
9	C.	4	5 44 34	5 13 8	"	—18.933	8 13.57
10	C.	4	5 18 10	5 18 19	"	—16.538	7 11.14
11	N.	2	5 27 14	5 27 22	"	—14.270	6 12.00
	S.	2	5 45 16	5 45 23		—13.796	5 59.46
12	N.	2	5 37 40	5 37 43	"	—11.744	5 6.17
	S.	2	5 53 42	5 53 52		—11.302	4 54.64
14	N.	3	5 26 27	5 26 44	"	— 6.937	3 0.83
	S.	3	5 40 40	5 40 55		— 6.454	2 48.26
15	N.	3	5 2 30	5 2 47	"	— 4.538	1 58.30
	S.	3	5 16 40	5 16 56		— 4.112	1 47.20
16	N.	3	5 40 25	5 40 37	"	— 2.221	57.91
	S.	3	5 44 20	5 44 12		— 1.733	45.25
17	N.	3	5 10 55	5 11 3	"	— 0.027	0.69
	S.	3	5 23 43	5 24 13		+ 0.481	12.55
	C.	1	4 50 23	4 50 31		+ 0.202	5.27

These reductions rarely afford precisely the same figures as are given in the Memoirs and Monthly Notices of the Royal Astronomical Society, although only few cases occur in which the discordance reached an amount capable of sensibly affecting the results. This seems best explicable upon the assumption that some little excess of delicacy was used at the Cape in points where the consequent accuracy was not thought to warrant fuller minuteness in publication, inasmuch as the effect would not be appreciable. In such instances, the figures published by Mr. Maclear have been employed; and the only deviations from the values given by that zealous and accomplished astronomer are for those cases in which the discordance is clearly due to some oversight in the reduction. This remark applies especially to the Cape sidereal times of observation, which appear to be means between the corrected indications of the clock and those of the hour-circle, and in which the want of entire accordance seems owing merely to some slight difference in the assumed correction of the ephemeris in right-ascension.

MARS I.

Observations with the Cape Equatorial.

Date.	Obs. part.	Cape S.T.	Wash. M.T.	$t - T$.	Star N°.	Star's δ.	Corrected $D\delta$.	Meas'd $\Delta\delta$.	Refr.	Obs'd δ.	N°. of comp. N.	S.
		h. m. s.	h. m. s.	d.		° ′ ″	′ ″	′ ″	″	° ′ ″		
1849.—Nov. 21	N. S.	5 47 45.74	7 22 6.74	−39.69298	21	+25 7 10.18	+10 3.41	+10 2.75	0.66	+25 17 13.59	2	2
	N. S.	5 47 45.74	7 22 6.74	39.69298	35	16 18.21	+ 53.62	+ 0 53.56	0.06	17 11.83	2	2
22	N. S.	7 13 0.94	8 43 12.06	38.63666	35	16 18.20	+ 4 32.12	+ 4 31.82	0.30	20 50.32	2	2
24	N. S.	6 32 8.96	7 54 34.96	36.67043	17	22 14.04	+ 5 21.69	+ 5 21.34	0.35	27 35.73	2	2
25	N. S.	6 18 31.45	7 57 3.77	35.68260	18	32 12.47	− 1 12.96	− 1 12.88	0.08	30 59.51	3	3
	N. S.	6 18 31.45	7 37 3.77	35.68260	19	34 53.25	− 3 53.75	− 3 53.50	0.25	30 59.50	3	3
26	N. S.	6 53 40.72	8 8 11.37	34.66098	18	32 12.46	+ 2 17.96	+ 2 17.81	0.15	34 30.42	3	3
27	N. S.	6 4 18.30	7 15 1.13	33.69790	25	42 22.65	− 4 38.21	− 4 37.91	0.30	37 44.44	7	7
28	N. S.	6 2 15.44	7 9 2.70	32.70205	25	42 22.64	− 1 16.73	− 1 16.65	0.08	41 5.91	6	6
29	N. S.	6 55 30.81	7 58 13.43	31.66790	25	42 22.63	+ 2 10.41	+ 2 10.26	0.15	44 33.04	3	3
30	N. S.	5 28 15.58	6 27 16.58	30.73106	25	42 22.61	+ 5 14.65	+ 5 14.29	0.36	47 37.26	2	2
Dec. 1	N. S.	6 2 55.97	6 57 55.39	29.70978	27	46 29.94	+ 4 22.95	+ 4 22.66	0.29	50 52.89	3	2
2	N. S.	7 25 1.93	8 15 51.98	28.65565	27	25 46 29.94	+ 7 42.39	+ 7 41.83	0.56	54 12.33	2	2
3	N. S.	6 3 29.66	6 50 36.96	27.71485	15	26 2 7.37	− 5 4.46	− 5 4.12	0.34	25 57 2.91	3	3
4	N. S.	6 1 40.58	6 44 52.27	26.71884	15	2 7.37	− 2 5.49	− 2 5.35	0.14	26 0 1.88	4	4
5	N. S.	5 52 5.85	6 31 23.39	25.72820	15	2 7.38	+ 0 45.44	+ 0 45.39	0.05	2 52.82	5	5
6	N. S.	6 9 45.87	6 45 4.61	24.71870	15	2 7.39	+ 3 33.75	+ 3 33.51	0.24	5 41.14	10	10
7	N. S.	5 48 18.48	6 19 44.83	23 73629	15	2 7.40	+ 6 12.46	+ 6 12.04	0.42	8 19.86	10	10
8	N. S.	6 13 26.43	6 40 52.75	22.72161	15	2 7.41	+ 8 45.83	+ 8 45.24	0.59	10 53.24	10	10
9	N. S.	6 24 47.88	6 48 16.42	21.71648	15	26 2 7.43	+11 12.29	+11 11.52	0.77	13 19.72	2	1
	N. S.	6 21 37.20	6 45 6.26	21.71868	12	25 55 38.50	+17 40.45	+17 39.24	1.21	13 18.95	2	2
10	N. S.	7 32 9.79	7 51 31.39	20.67255	10	26 22 54.52	− 7 12.51	− 7 11.94	0.57	15 42.01	4	4
11	N. S.	6 24 39.74	6 40 16.48	19.72203	10	22 54.54	− 5 11.33	− 5 10.97	0.36	17 43.21	2	1
14	N. S.	5 52 25.34	5 56 19.63	16.75255	10	22 54.61	+ 0 17.83	+ 0 17.81	0.02	23 12.44	5	5
15	N. S.	5 32 6.06	5 32 7.77	15.76936	10	22 54.63	+ 1 47.94	+ 1 47.82	0.12	24 42.57	5	5
16	N. S.	5 28 35.44	5 24 41.81	14.77452	10	22 54.65	+ 3 11.84	+ 3 11.62	0.22	26 6.49	5	5
	N. S.	6 16 21.04	6 12 19.59	14.74144	10	22 54.65	+ 3 13.04	+ 3 12.82	0.22	26 7.69	10	10
17	N. S.	6 26 8.30	6 18 9.34	13.73739	10	22 54.66	+ 4 25.65	+ 4 25.31	0.31	27 20.31	10	10
18	N. S.	6 12 18.28	6 0 25.67	12.74970	10	22 54.68	+ 5 28.51	+ 5 28.13	0.38	28 23.19	10	10
20	N. S.	5 49 10.66	5 29 30.01	10.77118	9	31 46.49	− 1 46.72	− 1 46.60	0.12	29 59.77	4	4
21	N. S.	6 34 13.76	6 10 29.83	9.74271	9	31 46.52	− 1 8.09	− 1 8.00	0.09	30 38.43	4	4
22	N. S.	6 15 1.00	5 47 24.30	8.75875	9	31 46.55	− 0 44.17	− 0 44.12	0.05	31 2.38	4	4
23	N. S.	5 29 48.99	4 58 23.78	7.79278	9	31 46.58	− 0 25.76	− 0 25.73	0.03	31 20.82	1	1
24	C.	6 32 20.22	5 56 48.85	6.75221	9	31 46.61	− 0 16.00	− 0 15.98	0.02	31 30.61	3	
25	N. S.	5 8 26.05	4 29 12.53	5.81305	9	31 46.64	− 0 14.15	− 0 14.13	0.02	31 32.49	5	5
	N. S.	5 38 42.35	4 59 23.87	5.79209	9	31 46.64	− 0 14.66	− 0 14.64	0.02	31 31.98	5	5
26	N. S.	4 47 2.67	4 3 56.74	4.83059	9	31 46 68	− 0 19.65	− 0 19.63	0.02	31 27.03	5	5
	N. S.	5 34 9.63	4 50 55.98	4.79796	8	31 22.64	+ 0 5.39	+ 0 5.38	0.01	31 28.03	5	5
29	N. S.	5 27 13 31	4 32 13.06	− 1.81096	9	31 46.78	− 1 16.51	− 1 16.42	0.09	30 30.27	3	2
1850.—Jan. 7	N. S.	5 44 46.65	4 14 20.32	+ 7.17662	1	13 59.86	+10 18.89	+10 18.17	0.72	23 18.75	2	2
8	N. S.	5 59 5.12	4 24 40.54	8.18380	1	12 59.89	+ 9 16.97	+ 9 16.31	0.66	22 16.86	2	2
9	C.	5 13 4.80	3 34 51.85	9.14921	1	12 59.92	+ 8 14.13	+ 8 13.57	0.56	21 14 05	4	
10	C.	5 18 14.70	3 36 4.99	10.15006	1	12 59.95	+ 7 11.63	+ 7 11.14	0.49	20 11.58	4	
11	N. S.	5 36 18.51	3 50 9.96	11.15984	1	12 59.98	+ 6 6.16	+ 6 5.74	0.42	19 6.14	2	2
12	N. S.	5 45 44.58	3 55 38.54	12.16364	1	13 0.01	+ 5 0.75	+ 5 0.40	0.35	18 0.76	2	2
14	N. S.	5 33 37.05	3 35 41.18	14.14978	1	13 0.06	+ 2 54.74	+ 2 54.54	0.20	15 54.80	3	3
15	N. S.	5 9 40.33	3 7 52.47	15.13047	1	13 0.09	+ 1 52.88	− 1 52.75	0.13	14 52.97	3	3
16	N. S.	5 42 26.16	3 36 37.03	16.15043	1	13 0.12	+ 0 51.64	− 0 51.58	0.06	13 51.76	3	3
17	N. C. S.	5 13 34.02	3 3 53.70	+17.12770	1	+26 13 0.14	− 0 5.85	− 0 5.84	0.01	+26 12 51.29	3 1	3

F.—OBSERVATIONS OF MARS I. WITH THE CAPE MURAL CIRCLE.

To be corrected in the *Memoirs* R.A.S., vol. xx.

Page 99,	November 24, Observed Z. D.,	*for* 38″. 62	*read*	33″. 62.
104,	December 12, App. R. A.,	" 5*h.* 53*m.*	"	5*h.* 52*m.*
105,	" 12, H. C. 11946	" 6 8 39.55	"	6 7 39.55

MARS I.

Observations with the Cape Mural Circle.

Date.	Obs. part.	Cape S.T.	Wash. M.T.	$t-T$.	Obs'd Zen. Dist.	Refr.	Obs'd δ.	N°. Comp. N.	N°. Comp. S.
		h. m. s.	h. m. s.	d.	° ′ ″	′ ″	° ′ ″		
1849.—Nov. 18	N. S.	6 23 48.04	8 9 50.86	— 42.65983	59 3 11.00	1 34.96	+ 25 7 8.00	1	1
19	N. S.	6 23 8.14	8 5 15.17	41.66302	6 33.22	1 34.62	10 30.22	1	1
21	N. S.	6 21 36.84	7 55 52.30	39.66953	13 20.13	1 36.28	17 17.13	1	1
22	N. S.		7 51 5.18	38.67286	16 49.76	1 34.74	20 46.76	1	1
24	N. S.	6 18 51.51	7 41 19.69	36.67963	23 19.85	1 36.63	27 16.85	1	1
25	N. S.		7 36 22.43	35.68307	26 58.27	1 37.66	30 55.27	1	1
27	N. S.	6 15 35.71	7 26 16.69	33.69008	33 50.62	1 36.83	37 47.62	3	2
28	N. S.	6 14 23.48	7 21 8.75	32.69365	37 11.42	1 36.93	41 8.42	3	2
29	N. S.		7 15 57.56	31.69725	40 30.51	1 36.49	44 27.51	1	2
30	N. S.	6 11 49.46	7 10 43.33	30.70089	43 43.13	1 38.37	47 40.13	1	2
Dec. 1	N. S.		7 5 26.18	29.70456	46 55.53	1 38.91	50 52.53	2	1
2	N. S.	6 9 3.91	7 0 6.41	28.70826	50 5.73	1 37.37	54 2.73	2	2
3	N. S.		6 54 43.72	27.71199	53 7.80	1 36.98	57 4.80	1	1
4	N. S.		6 49 18.46	26.71576	59 56 7.68	1 37.36	26 0 4.68	2	2
6	N. S.		6 38 20.74	24.72337	60 1 43.96	1 37.84	26 5 40.96	2	2
7	N. S.		6 32 48.70	23.72721	4 24.53	1 37.62	8 21.53	2	1
8	N. S.		6 27 14.75	22.73108	6 56.08	1 37.61	10 53.08	2	2
9	N. S.		6 21 39.22	21.73496	9 21.74	1 39.27	13 18.74	2	2
10	N. S.	5 56 25.05	6 16 2.34	20.73886	11 34.70	1 38.77	15 31.70	2	2
11	N. S.	5 54 42.00	6 10 23.65	19.74278	13 43.08	1 38.68	17 40.08	2	2
12	N. S.	5 52 58 33	6 4 44.38	18.74671	15 41.78	1 40.14	19 38.78	1	1
14	N. S.	5 49 28.74	5 53 23.52	16.75459	19 14.75	1 40.39	23 11.75	2	2
15	N. S.	5 47 43.14	5 47 42.29	15.75854	20 48 62	1 39.39	24 45.62	2	2
16	N. S.	5 45 57.60	5 42 1.12	14.76249	22 9.43	1 38.22	26 6.43	1	1
17	N. S.	5 44 12.23	5 36 20.14	13.76643	23 26.56	1 39.03	27 23.56	2	2
18	N. S.	5 42 27.16	5 30 39.44	12.77038	24 25.64	1 39.48	28 22.64	2	2
20	N. S.	5 38 59.22	5 19 20.24	10.77824	26 3 29	1 40.96	30 0.29	1	1
21	N. S.	5 37 16.80	5 13 42.20	9.78215	26 39.46	1 40.98	30 36.46	2	2
22	N. S.		5 8 5.26	8.78605	27 6.13	1 40.09	31 3.13	2	2
23	N. S.	5 33 55.59	5 2 29.71	7.78993	27 23.56	1 39.28	31 20.56	2	2
24	N. S.	5 32 17.64	4 56 55.95	6.79380	27 32.29	1 40.98	31 29.29	2	2
26	N. S.	5 29 7.21	4 45 54.38	4.80145	27 30.07	1 39.46	31 27.07	2	2
27	N. S.	5 27 35.16	4 40 26.67	3.80525	27 18.95	1 40 10	31 15.95	2	2
29	N. S.	5 24 33.73	4 29 38.90	— 1.81874	26 34.42	1 39.55	30 31.42	2	2
31	N. S.	5 20 53.05	4 18 2.01	+ 0.17919	25 26.70	1 40.63	29 23.70	2	2
1850.—Jan. 3	N. S.	5 18 5.27	4 3 26.96	3.16906	23 13.48	1 38.82	27 10.48	2	2
4	N. S.	5 16 55.66	3 58 21.63	4.16553	22 21.07	1 38.69	26 18.07	2	2
7	N. S.	5 13 46.97	3 43 25.70	7.15516	19 22.25	1 40.34	23 19.25	1	1
8	C.	5 12 50.86	3 38 33.86	8.15178	18 21.23	1 39.47	22 18.23	4	
9	C.	5 11 58.33	3 33 45.56	9.14844	17 22.09	1 39.51	21 19.09	1	
10	C.	5 11 9.31	3 29 0.77	10.14515	16 17.41	1 37.98	20 14.41	5	
11	C.	5 10 23.91	3 24 19.58	11.14189	15 11.24	1 37.84	19 8.24	5	
12	C.	5 9 42.22	3 19 42.08	12.13868	14 7.97	1 39.22	18 4.97	5	
14	C.	5 8 29.71	3 10 37.95	14.13238	12 0.97	1 38.24	15 57.97	5	
15	C.	5 7 58.35	3 6 10.76	15.12929	10 58.99	1 38.61	14 55.99	4	
16	C.	5 7 31.91	3 1 48.49	16.12626	9 57.81	1 38.36	13 54.81	5	
17	C.		2 57 29.13	+ 17.12325	60 9 0.22	1 37.46	+ 26 12 57.22	5	

G.—OBSERVATIONS OF MARS I. WITH THE CAMBRIDGE EQUATORIAL.

A comparatively large number of observations of right-ascension only are given in the present volume; as these however not only have no relation to the problem before us, but are incapable, under any circumstances, of furnishing a trustworthy value for the parallax, (s. *Astronomical Journal*, N°. 103,) they have not been critically examined. To the observations for declination the following corrections or modifications have been applied:—

Page 453, November 15, 16. The "unknown star" is the comparison-star of the preceding day.—(Bessel Z. 348.)

454, " 16, 17. The comparisons were evidently with the *south* limb, not the north.

457, December 17. Mean $\Delta\delta$, *for* 3′ 34″. 69 *read* 0′ 34″. 69.

458, " 27. The planet was *south* of Bessel Z. 405, not north.

458, " 29, 30. There is some undetected error here.

459, January 1. The comparisons are neither accordant with one another nor with the mean. The second series, upon reduction, gives $\Delta\delta = 0' 34''.10 - 0''.02 = 0' 34''.08$; but even then the difference between the north and south limb is nearly twice the diameter of the planet. The comparisons will, if used as follows, give nearly the average accordance with the Ephemeris:

Mars, S. limb, N. of Bessel 405.

Chron.	Corr.	Sid. time.	Microm.	Adopted zero.	Micrometer Rev.	Micrometer Arc.	Corr.	$\Delta\delta$
1*h*. 54*m*. 40*s*. 8.	59*s*. 4.	1*h*. 53*m*. 41*s*. 4.	53*r*.428.	50*r*. 034.	3*r*. 394	33″. 26	—0. 02	33. 24

and the values have been assumed.

460, " 5, results, line 1, Mean $\Delta\delta$, *for* 1′ 45″. 10 *read* 2′ 4″. 10.
3, " " 1 45 .01 " 2 4 .01

460, " 5, " 3, Microm. " 8*r*. 394 " 18*r*. 394

The Cambridge series will then be as follows:

MARS I.

Observations with the Cambridge Equatorial.

Date.	Obs. part.	Camb. S.T.	Wash. M.T.	$t-T$.	Star No.	Star's δ.	Meas. $D\delta$.	Refr.	Obs'd δ.	N°. comp N.	N°. comp S.
		h. m. s.	*h. m. s.*	*d.*		° ′ ″	′ ″		° ′ ″		
1849.—Nov. 14	N. S.	6 42 8.05	14 41 18 46	—46.38798	34	+24 57 13.56	—2 35.52	0″.05	+24 54 37.99	3	4
15	N.	9 50 9.35	17 44 53.04	45.26050	30	25 1 46.63	—3 22.56	.08	58 23.99		1
	S.	10 2 51.01	17 57 32.62	45.25171	34	24 57 13.53	+ 54.36	.02	24 58 7.91		3
16	N. S.	2 41 22.98	10 33 21.00	44.56017	30	25 1 46.60	—1 14.59	.04	25 0 31.97	4	4
	S.	10 32 16.55	18 22 57.42	44.23406	30	1 46.60	— 18.07	.01	1 28.52		2
21	N. S.	3 21 13.46	10 53 25.41	39.54623	26	14 16.54	+3 8.46	.07	17 25.07	5	10
	N. S.	10 14 48.29	17 47 52.16	39.25842	26	14 16.54	+4 6.13	.11	18 22.78	5	6
26	S.	10 58 38.65	18 9 56.11	34.24310	22	35 14.71	+ 11.95	.01	35 26.67		5
30	N. S.	10 44 31.67	17 50 7.80	30.25685	20	25 45 36.56	+3 12.02	.10	25 48 48.68	1	6
Dec. 6	C.	11 50 52.75	18 22 42.54	24.23423		26 9	—2 1.51	.14	26 6		8
11	N. S.	55 21.97	7 9 19.60	19.70206	13	16 22.42	+1 3.55	.04	17 26.01	5	3
12	N.	1 59 3.17	8 8 54.46	18.66048		19	+ 3.00	00	19		1
17	N.	2 10 4.80	8 0 14.63	13.66650	11	26 39.62	+ 34.67	.01	27 14.30		4
18	S.	3 4 49.77	8 50 54.81	12.63131		29	—1 6.52	.02	28		1
21	S.	2 36 14.38	8 10 36.38	9.65930		29	+ 51.06	.02	30		5
27	N.	2 43 36.12	7 54 21.44	3.67058	8	31 23.67	— 18.41	.01	31 4.25		5
28	S.	1 44 1.50	6 51 0.67	2.71458	7	26 58.30	+3 35.28	.08	30 33.66		2
	N. S.	3 11 3.90	8 17 48.81	2.65430	7	26 58.30	+3 40.64	0.07	30 39.01	5	5
29	N.	12 17 13.70	17 18 33.22	— 1.27878	6	34 2.00	—3 51.91	1.45	30 8.64		4
31	S.	6 4 1.98	10 58 30.81	+ 0.45730	5	27 39.52	+1 11.03	0.02	28 50.57		12
1850.—Jan. 1	S.	1 53 41.40	6 44 55.34	1.28120	5	27 39.56	+ 33.24	.01	28 12.81		11
4	N.	1 46 58.82	6 26 26.13	4.26836	4	26 46.97	— 46.05	.02	26 0.90		4
5	N. S.	4 44 31.07	9 19 33.38	5.38858	4	26 47.01	—1 55.41	.04	24 51.56	5	5
6	S.	1 35 31.77	6 7 9.13	6.25497		+26 21	+3 0.10	.07	26 23		7
10	S.	2 26 28.06	6 42 13.44	+10.27932			+3 33.80	0.07			7

H.—OBSERVATIONS OF MARS I. WITH THE ATHENS MERIDIAN-CIRCLE.

The observations of Mars at Athens were made by Professor Bouris, then Director of the observatory at that place, for the special purpose of proving useful in connection with the labors of Lieut. Gilliss at Santiago, the meridian-circle being the only instrument at the observatory available for the purpose. A full description of the measurements and their results, together with an extended discussion, is given by Mr. Bouris in the *Astronomische Nachrichten,* vol. XXXVII, pp. 153–188. On only four nights was the observation of *β Tauri* omitted; and, in general, the choice of other stars was guided by the programme of *Mars*-culminating stars in the London Nautical Almanac for 1849. The readings of the alhidade-level and the corrections for refraction computed in triplicate by Mr. Bouris are there given, and after such painstaking zeal on his part, it has seemed superfluous to renew any part of the computation. I have consequently adopted the values of the correction for refraction as given by this astronomer.

The only typographical errors to be noticed are:

Page 165,	Nov. 26,	5 Geminorum,	Circle-reading, *for* 346° 30′ 44″.63, *read* 346° 29′ 44″.63.
"	Dec. 14,	1937 B.A C.,	Level, *for* 2″.08, *read* 2″.80.
167,	Jan. 2,		*for* 1648 Hist. Cél., *read* 1648 B.A.C.
"	3,		" " " " " "
"	5,		" " " " " "
168,	6,	10669,	H. C. Result, *for* 34″.50, *read* 31″.50.
169,	15,	Mars N.	Circle-reading, *for* 348° 17′ 21″.50, *read* 348° 18′ 21″.50.
171,	Feb. 1–10,		*for* 1754, Hist. Cél., *read* 1754 B. A. C.

The diaphragm of the Athens circle was provided with two fixed horizontal threads, at a distance from one another which Mr. Bouris gives as 26″. To insure variety of circumstance, and for other reasons mentioned in his article already cited, Professor Bouris adopted the practice of observing with the two threads alternately, using the one on the even, the other on the odd days of the month, analogously to the rule which he followed for guiding his selection of the limb to be observed.

The first question for consideration, therefore, is to deduce from the materials furnished the best value for the distance of these threads. The following table presents in a compact form the data as obtained from the values of the zenith-distance of the zero-point, afforded by the individual observations. Denoting the two threads by the letters *A* and *B*, the former being the upper, (or that one which furnishes the larger circle-reading for the observation, and the smaller for the zenith-distance of the zero-point,) the table will explain itself. The columns headed "Sum" present the sum-total of the seconds, belonging to the distance upon the graduated arc. From the sums at the foot of the columns, we deduce the adopted value of the thread-interval 27″.299, which has been employed through the whole series; careful scrutiny having failed to detect either any gradual or any sudden and permanent change in this value during the entire series of *Mars*-observations.

Interval of Declination-threads in the Athens Meridian-Circle.

*	Name.	A.		B.		Mean.		B—A.
		N°. Obs.	Sum.	N°. Obs.	Sum.	A.	B.	
a	B. A. C. 1648 .	1	11.2	2	80.3	11.20	40.15	28.95
b	β Tauri . . .	17	217.9	17	680.3	12.82	40.02	27.20
c	118 Tauri . .	6	62.3	5	192.6	10.38	38.52	28.14
d	B. A. C. 1754 .	7	96.2	7	279.2	13.74	39.89	26.15
e	125 Tauri . .	1	12.3	3	115.2	12.30	38.40	26.10
f	B. A. C. 1937 .	14	192.0	13	536.1	13.71	41.24	27.58
g	5 Geminorum .	2	25.7	2	85.6	12.86	42.78	29.92
1	B. A. C. 1562 .	7	94.7	6	243.7	13.53	40.62	27.09
9	Lal. 10669 . .	8	87.6	6	226.8	10.95	37.80	26.85
10	Lal. 11108 . .	9	124.9	8	330.5	13.88	41.31	27.43
12	139 Tauri . .	2	24.4	3	117.4	12.20	39.13	26.93
15	Lal. 11684 . .	1	12.1			12.07		
17	Lal. 11854 . .			1	37.2		37.22	
18	Lal. 11946 . .			1	42.7		42.71	
21	B. A. C. 2058 .	1	11.9			11.91		
25	Lal. 12336 . .	1	12.2	1	39.2	12.15	39.23	27.08
35	ε Geminorum .	1	11.9	1	39.6	11.91	39.56	27.65
	Sum . . .	78	997.3	76	3046.4	12.785	40.084	27.299

The thread A has been taken as the standard, and all the circle-readings corresponding to observations with B, are reduced by subtracting the assumed distance between the two threads. The observations on the successive days hardly permit any trustworthy inferences regarding the fluctuations of the zenith-point, but show the nonexistence of any progressive change. They are here given in full detail in the table of circle-readings.

In this table all the observations of each star are grouped together; the columns headed *Level* and *Refraction* being taken directly from Professor Bouris's paper. The apparent declinations of the stars observed have been deduced from the list of mean places and constants for reduction to the apparent equinox, given at the close of the preceding division of this article. The ninth column, headed *Zero of circle*, gives the declination corresponding to the circle-reading 0°, or, in other words, the distance of the equator-point for the thread A from the zero of graduation, as indicated by each observation.

Circle-readings of Stars observed at Athens in connexion with Mars I.

No.	Name.	Date.	Circle.	Level.	Refraction.	Corr'd reading.	Star's δ.	Zero of circle.
			° ′ ″	″	″	° ′ ″	° ′ ″	° ′ ″
b	β Tauri	1849.—Nov. 22	350 31 24.00	—4.16	—9.57	350 31 10.27	+28 28 22.3	37 57 12.0
		23	30 58.00	4.24	9.62	30 44.14	22.4	11.0
		25	30 52.63	2.24	9.41	30 40.98	22.5	14.2
		26	31 20.75	1.44	9.28	31 10.03	22.5	12.5
		28	31 21.88	1.36	9.51	31 11.01	22.6	11.6
		29	30 50.75	0.08	9.67	30 41.00	22.6	14.3
		30	31 18.50	0.40	9.66	31 8.44	22.7	14.3
		Dec. 4	31 23.00	4.08	9.66	31 9.26	22.9	13.6
		9	30 56.38	1.52	9.71	30 45.15	23.1	10.7
		14	31 24.63	2.08	9.77	31 12.78	23.2	10.4
		15	30 56.13	1.28	9.84	30 45.01	23.3	11.0
		16	31 23.88	2.08	9.73	31 12.07	23.4	11.3
		17	30 51.63	0.24	9.69	30 41.70	23.4	14.4
		19	30 56.88	1.52	9.64	30 45.72	23.5	10.5
		21	30 58.25	2.64	9.59	30 46.02	23.6	10.3
		22	31 22.13	—0.48	9.64	31 12.01	23.7	11.7
		23	30 52.50	+1.04	9.57	30 43.97	23.7	12.4
		24	31 20.50	—0.40	9.53	31 10.57	23.8	13.2
		28	31 21.13	1.76	9.46	31 9.91	24.0	13.1
		29	30 53.00	1.44	9.49	30 42.07	24.0	14.6
		1850.—Jan. 1	30 53.38	—1.60	9.58	30 42.20	24.1	14.6
		8	31 18.25	0.00	9.67	31 8.58	24.5	15.9
		10	31 19.25	+1.92	9.62	31 11.55	24.6	13.0
		15	30 53.63	—0.08	9.74	30 43.81	24.8	13.7
		19	30 56.00	—1.92	9.54	30 44.54	24.9	13.1
		26	31 20.25	+0.24	9.80	31 10.69	25.2	14.5
		27	30 51.50	2.24	9.49	30 44.25	25.2	13.6
		29	30 54.38	1.04	9.87	30 45.55	25.3	12.4
		Feb. 1	31 23.00	1.44	10.18	31 14.26	25.3	11.0
		2	31 20.50	+0.88	9.83	31 11.55	25.4	13.8
		3	30 55.75	—0.56	9.79	30 45.40	25.4	12.7
		4	31 22.13	+0.16	9.67	31 12.62	25.4	12.8
		5	30 55.75	—0.56	9.66	30 45.53	25.5	12.7
		10	31 20.63	+1.68	9.70	31 12.61	25.6	13.0
								12.76
21	B. A. C. 2058	1849.—Nov. 22	347 10 15.75	—4.40	13.06	347 9 58.29	+25 7 10.2	37 57 11.9
35	ε Geminorum	1849.—Nov. 22	347 19 23.25	—4.08	12.90	347 19 6.27	+25 16 18.2	37 57 11.9
		23	18 56.25	—4.80	12.91	18 38.54	18.1	12.3
								12.10
17	H. C. 11854	1849.—Nov. 23	347 24 53.75	—4.16	12.81	347 24 36.78	+25 22 14.0	37 57 10.2
g	5 Geminorum	1849.—Nov. 25	346 29 16.00	—2.32	13.52	346 29 0.16	+24 26 43.5	37 57 16.0
		26	29 44.63	0.24	13.35	30 31.04	43.5	12.5
		28	29 46.88	—2.96	13.67	29 30.25	43.5	13.3
		29	29 14.63	+0.56	13.90	29 1.29	43.4	14.9
								14.18
18	H. C. 11946	1849.—Nov. 25	347 34 44.25	—2.16	12.40	347 34 29.69	+25 32 12.4	37 57 15.4
25	H. C. 12336	1849.—Nov. 28	347 45 24.63	—1.84	12.34	347 45 10.45	+25 42 22.6	37 57 12.2
		29	44 55.75	+0.16	12.54	44 43.37	22.6	11.9
								12.05
f	B. A. C. 1937	1849.—Dec. 4	347 29 34.25	—4.16	12.80	347 29 17.29	+25 26 31.6	37 57 14.3
		14	29 36.13	2.08	12.96	29 20.37	31.7	11.3
		15	29 6.50	0.72	13.02	28 52.76	31.8	11.7
		16	29 33.88	—1.44	12.89	29 19.55	31.8	12.2
		17	29 2.25	+0.32	12.84	28 49.73	31.8	14.8
		19	29 6.25	—1.44	12.77	28 52.04	31.8	12.5
		21	29 7.13	—2.16	12.75	28 52.22	31.9	12.4
		22	29 32.00	+0.16	12.77	29 19.39	31.9	12.5
		23	29 2.75	1.44	12.70	28 51.49	31.9	13.1
		24	29 32.25	+0.64	12.66	29 20.23	31.9	11.7

Circle-readings of Stars observed at Athens in connection with Mars I—Continued.

No.	Name.	Date.	Circle.	Level.	Refraction.	Corr'd reading.	Star's δ.	Zero of circle.
			° ′ ″	″	′	° ′ ″	° ′ ″	° ′ ″
f	B. A. C. 1937	1849.—Dec. 28	347 29 30.25	—0.56	12.55	347 29 17.14	+25 26 32.0	37 57 14.9
		29	29 2.88	0.00	12.61	28 50.27	32.0	14.4
		1850.—Jan. 2	29 31.88	+0.72	12.82	29 19.78	32.1	12.3
		3	29 4.75	—0.72	12.74	28 51.29	32.1	13.5
		5	29 5.63	—1.92	12.82	28 50.89	32.2	14.0
		6	29 28.88	+1.04	12.86	29 17.06	32.2	15.1
		8	29 28.13	+0.96	12.84	29 16.25	32.3	16.0
		19	29 5.63	—0.88	12.66	28 52.09	32.6	13.2
		26	29 29.88	+0.24	12.99	29 17.13	32.9	15.8
		27	29 2.50	0.56	12.59	28 50.47	32.9	15.1
		29	29 3.13	1.36	13.11	28 51.38	33.0	14.3
		Feb. 1	29 30.75	3.52	13.54	29 20.73	33.1	12.4
		2	29 28.50	+1.52	13.03	29 16.99	33.1	16.1
		3	29 5.38	—1.20	12.96	28 51.22	33.1	14.6
		4	29 32.75	+0.16	12.81	29 20.10	33.2	13.1
		5	29 3.75	—0 64	12.80	28 50.31	33.2	15.6
		10	29 30.38	+1.60	12.86	29 19.12	33.3	14.2
								13.74
15	H. C. 11684 .	1849.—Dec. 4	348 5 11.13	—3.60	12.20	348 4 55.33	+26 2 7.4	37 57 12.07
12	139 Tauri . .	1849.—Dec. 9	347 58 13.75	—1.52	12.37	347 57 59.86	+25 55 38.5	37 57 11.3
		1850.—Feb. 3	58 12.75	—1.52	12.45	57 58.78	39.1	13.0
		4	58 39.63	+0.48	12.30	58 27.81	39.2	11.4
		5	58 13.75	—0.80	12.29	58 0.66	39.2	11.2
		10	58 36.50	+2.24	12.35	58 26.39	39.4	13.0
								11.98
10	H. C. 11108 .	1849.—Dec. 14	348 25 56.25	—2.08	11.98	348 25 42.19	+26 22 54.6	37 57 12.4
		15	25 28.13	1.52	12.03	25 14.58	54.6	12.7
		22	25 54.63	—0.72	11.80	25 42.11	54.8	12.7
		23	25 24.13	+1.52	11.72	25 13.93	54.8	13.6
		24	25 52.75	—0.08	11.69	25 40.98	54.8	13.8
		1850.—Jan. 2	25 54.38	0.80	11.84	25 41.74	55.1	13.4
		3	25 25.13	0.72	11.77	25 12.64	55.2	15.3
		5	25 29.25	3.60	11.84	25 13.81	55.2	14.1
		6	25 52.00	+0.56	11.88	25 40.68	55.2	14.5
		19	25 28.38	—1.04	11.68	25 15.66	55.7	12.7
		26	25 52.75	—1.36	11.99	25 39.40	55.9	16.5
		27	25 24.00	+1.12	11.62	25 13.50	55.9	15.1
		29	25 27.25	0.80	12.10	25 15.95	56.0	12.8
		Feb. 1	25 53.38	+2 40	12.50	25 43.28	56.1	12.8
		3	25 26.13	—1.04	11.98	25 13.11	56.2	15.8
		4	25 55.25	0.00	11.84	25 43.41	56.2	12.8
		10	25 50.63	+1.68	11.88	25 40.43	56.4	16.0
								13.94
10*	H. C. 11108 pr.	1849.—Dec. 28	348 27 1.50	—0.64	11.59	348 26 49.27	+26 22	
		29	26 37.13	0.08	11.64	26 25.41		
		1850.—Feb. 5	26 38.63	—0.72	11.82	26 26.09		
e	125 Tauri . .	1849.—Dec. 17	347 50 51.88	—0.32	12.46	347 50 39.10	+25 48 18.7	37 57 12.3
		19	50 55.50	1.52	12.39	50 41.59	18.8	10.0
		22	51 19.50	—0.64	12.39	51 6.47	18.8	12.3
		23	50 51.75	+1.04	12.31	50 40.48	18.9	11.1
								11.42
c	118 Tauri . .	1849.—Dec. 24	347 4 18.75	+0.88	13.10	347 4 6.53	+25 1 15.6	37 57 9.1
		29	3 50.38	—0.72	13.05	3 36.61	15.7	11.8
		1850.—Jan. 10	4 17.50	+2.16	13.22	4 6.44	16.0	9.6
		15	3 49.75	+0.24	13.39	3 36.60	16.1	12.2
		26	4 18.50	—0.16	13.47	4 4.87	16.4	11.5
		29	3 52.38	+1.12	13.57	3 39.93	16.5	9.3
		Feb. 1	4 16.75	2.80	14.01	4 5.54	16.5	11.0
		2	4 19.00	+0.56	13.51	4 6.05	16.6	10.6

Circle-readings of Stars observed at Athens in connection with Mars I—Continued.

No.	Name.	Date.	Circle.	Level.	Refraction.	Corr'd reading.	Star's δ	Zero of circle.
			° ′ ″	″	″	° ′ ″	° ′ ″	° ′ ″
c	118 Tauri . .	1850.—Feb. 3	347 3 52.00	—0.96	13.45	347 3 37.59	+25 1 16.6	37 57 11.7
		5	3 52.38	—0.80	13.27	3 38.31	16.7	11.1
		10	4 18.13	+1.36	13.32	4 6.17	16.7	10.5
								10.76
9	H. C. 10669 .	1849.—Dec. 29	348 34 18.63	—0.40	11.48	348 34 6.75	+26 31 46.8	37 57 12.7
		1850.—Jan. 2	34 46.38	+0.32	11.68	34 35.02	44.5	9.5
		3	34 19.13	—0.64	11.61	34 6.88	44.5	10.3
		6	34 42.25	+0.96	11.71	34 31.50	44.6	13.1
		8	34 42.13	+0.80	11.69	34 31.24	44.7	13.5
		19	34 20.88	—1.20	11.53	34 8.15	45.1	9.7
		26	34 45.63	+0.48	11.84	34 34.27	45.3	11.0
		29	34 20.13	0.80	11.93	34 9.00	45.4	9.1
		Feb. 1	34 45.63	2.40	12.32	34 35.71	45.5	9.8
		2	34 46.13	+0.80	11.88	34 35.05	45.6	10.6
		3	34 19.88	—0.96	11.81	34 7.11	45.6	11.2
		4	34 48.50	0.56	11.68	34 36.26	45.6	9.3
		5	34 20.50	—0.56	11.66	34 8.28	45.6	10.0
		10	34 44.75	+2.00	11.71	34 35.04	45.8	10.8
								10.76
a	B. A. C. 1648	1850.—Jan. 2	349 50 52.75	—1.36	10.35	349 50 41.04	+27 47 52.2	37 57 11.2
		3	50 23.13	0.56	10.30	50 12.27	52.3	12.7
		5	50 24.63	—2.16	10.35	50 12.12	52.4	13.0
								12.30
d	B. A. C. 1754	1850.—Jan. 5	348 51 57.25	—3.12	11.36	348 51 42.77	+26 49 23.2	37 57 13.1
		6	52 19.63	+0.64	11.40	52 8.87	23.2	14.3
		8	52 19.75	0.24	11.37	52 8.62	23.3	14.7
		10	52 20.13	+1.68	11.31	52 10.50	23.3	12.8
		15	51 56.00	0.00	11.45	51 44.55	23.5	11.7
		19	51 57.13	—1.84	11.20	51 44.09	23.6	12.2
		26	52 20.50	—0.16	11.52	52 8.82	23.9	15.1
		27	51 53.25	+1.20	11.15	51 43.30	23.9	13.3
		29	51 56.00	0.72	11.61	51 45.11	24.0	11.6
		Feb. 1	52 22.63	1.68	11.99	52 12.32	24.1	11.8
		2	52 21.38	+1.04	11.55	52 10.87	24.1	13.2
		3	51 55.50	—1.04	11.50	51 42.96	24.2	13.9
		4	52 23.63	0.16	11.36	52 12.11	24.2	12.1
		5	51 56.50	—0.72	11.35	51 44.33	24.2	12.5
		10	52 19.63	+1.84	11.40	52 10.07	24.3	14.2
								13.10
1	B. A. C. 1562	1850.—Jan. 6	348 15 58.75	—0.72	12.04	348 15 45.99	+26 12 59.8	37 57 13.8
		8	15 57.38	0.08	12.02	15 45.28	59.9	14.6
		15	15 32.00	0.40	12.11	15 19.49	13 0.1	13.3
		19	15 32.50	1.04	11.85	15 19.61	0.2	13.3
		26	15 58.50	—0.08	12.18	15 46.24	0.4	14.2
		27	15 29.88	+0.80	11.80	15 18.88	0.4	14.2
		29	15 32.00	1.28	12.27	15 21.01	0.4	12.1
		Feb. 1	15 58.50	3.20	12.66	15 49.04	0.5	11.5
		2	15 58.13	+0.80	12.22	15 46.71	0.5	13.8
		3	15 32.38	—0.64	12.17	15 19.57	0.5	13.6
		4	16 0.25	0.08	12.02	15 48.15	0.5	12.3
		5	15 32.25	—0.48	12.01	15 19.76	0.5	13.4
		10	15 56.63	+1.52	12.06	15 46.09	0.6	14.5
								13.43

The mean equator reading for the series is as previously shown, 360° —37° 57′ 12″.78, which value might be employed for the entire set of *Mars*-observations without danger of introducing any essentially injurious error. But to obviate any distrust arising from this mode of deducing the results, the stars observed on each day have been used to establish the zero-points from which the declinations of *Mars* on the same day should be counted.

Equator-points of the Athens Circle.

Date.	*	Seconds-reading.		
		Observed.	Mean.	Adopted.
		″	″	″
1849.—November 22	b	12.0		
	21	11.9	11.93	11.9
	35	11.9		
23	b	11.0		
	17	10.2	11.17	11.2
	35	12.3		
25	b	14.2		
	g	16.0	15.20	15.1
	18	15.4		
26	b	12.5	12.50	12.5
	g	12.5		
28	b	11.6		
	g	13.3	12.37	12.3
	25	12.2		
29	b	14.3		
	g	14.9	13.70	13.7
	25	11.9		
30	b	14.3	14.30	14.0
December 4	b	13.6		
	f	14.3	13.33	13.3
	15	12.1		
9	b	10.7	11.00	11.0
	12	11.3		
14	b	10.4		
	10	12.4	11.37	11.4
	c	11.3		
15		11.0		
	10	12.7	11.80	11.8
	f	11.7		
16	b	11.3	11.75	11.8
	f	12.2		
17	b	14.4		
	e	12.3	13.83	12.8
	f	14.8		
19	b	10.5		
	e	10.0	11.00	11.0
	f	12.5		
21	b	10.3	11.35	11.3
	f	12.4		
22	b	11.7		
	e	12.3	12.30	12.3
	10	12.7		
	f	12.5		
23	b	12.4		
	e	11.1		
	10	13.6	12.55	12.5
	f	13.1		

Date.	*	Seconds-reading.		
		Observed.	Mean.	Adopted.
		″	″	″
1849.—December 24	b	13.2		
	c	9.1	11.95	12.0
	10	13.8		
	f	11.7		
28	b	13.1	14.00	14.0
	f	14.9		
29	b	14.6		
	c	11.8	13.38	13.4
	9	12.7		
	f	14.4		
1850.—January 1	b	14.6	14.60	13.4
2	a	11.2		
	9	9.5	11.60	12.4
	10	13.4		
	f	12.3		
3	a	12.7		
	9	10.3	12.95	13.0
	10	15.3		
	f	13.5		
5	a	13.1		
	d	13.0	13.55	13.5
	10	14.1		
	f	14.0		
6	1	13.8		
	d	14.3		
	9	13.1	14.16	14.2
	10	14.5		
	f	15.1		
8	1	14.6		
	b	15.9		
	d	14.7	14.94	14.9
	9	13.5		
	f	16.0		
10	b	13.0		
	c	9.6	11.80	12.8
	d	12.8		
15	1	13.3		
	b	13.7	12.72	12.7
	c	12.2		
	d	11.7		
19	1	13.3		
	b	13.1		
	d	12.2	12.37	12.4
	9	9.7		
	10	12.7		
	f	13.2		

Equator points of the Athens-Circle—Continued.

Date.	*	Seconds reading. Observed.	Mean.	Adopted.	Date.	*	Seconds reading. Observed.	Mean.	Adopted.
		″	″	′			″	″	″
1850.—January 26	1	14.2			1850.—February 3	1	13.6		
	b	14.5				b	12.7		
	c	11.5				c	11.7		
	d	15.1	14.09	14.1		d	13.9		
	9	11.0				9	11.2	13.31	13.3
	10	16.5				10	15.8		
	f	15.8				12	13.0		
27	1	14.2				f	14.6		
	b	13.6							
	d	13.3	14.26	14.3	4	1	12.3		
	10	15.1				b	12.8		
	f	15.1				d	12.1		
29	1	12.1				9	9.3	11.97	12.0
	b	12.4				10	12.8		
	c	9.3				12	11.4		
	d	11.6	11.66	11.8		f	13.1		
	9	9.1							
	10	12.8			5	1	13.4		
	f	14.3				b	12.7		
February 1	1	11.5				c	11.1		
	b	11.0				d	12.5	12.36	12.4
	c	11.0				9	10.0		
	d	11.8	11.47	11.5		12	11.2		
	9	9.8				f	15.6		
	10	12.8			10	1	14.5		
	f	12.4				b	13.0		
2	1	13.8				c	10.5		
	b	13.8				d	14.2	13.28	13.3
	c	10.6	13.02	13.0		9	10.8		
	d	13.2				10	16.0		
	9	10.6				12	13.0		
	f	16.1				f	14.2		

The quantities here given are the number of seconds to be added to 37° 57′ in order to obtain the declination corresponding to the zero of the circle. For this purpose all the observations are referred to the thread *A*; and besides their mean for each day, as given in the fourth column, a fifth column is added, containing that value which, after some consideration of the weights to be attributed to the different observations and comparison with the results obtained for the preceding and following days, seemed best fitted for conducting to tolerably accordant results. Comparison of the several observations of each night with their mean gives the mean error of a single measurement at Athens of a star's declination, $\varepsilon = \pm\ 1''.444$.

Making use of the equator points in the fifth column of the preceding table, we obtain the series of *Mars* observations at Athens in the annexed form.

MARS I.

Observations with the Athens Meridian-Circle.

Date.	Obs. part.	Athens S.T.	Wash. M.T.	$t - T.$	Circle reading.	Level.	Refr.	Equator.	Obs'd δ.
		h. m. s.	h. m. s.	d.	° ′ ″	″	″	″	° ′ ″
1849.—Nov. 22	S.	6 20 44.6	7 30 7	—38.68742	347 23 19.50	—4.00	12.82	11.9	+25 20 14.6
23	N.	6 19 49.8	7 25 16	37.69079	347 26 38.50	—4.00	12.78	38.5	25 24 0.2
25	N.	6 17 49.4	7 15 24	35.69764	347 33 23.25	—2.24	12.43	42.4	25 30 51.0
26	S.	6 16 43.9	7 10 23	34.70113	347 36 55.50	—0.08	12.19	12.5	25 33 55.7
28	S.	6 14 22.9	7 0 11	32.70821	347 43 42.38	—3.12	12.35	12.3	25 40 39.2
29	N.	6 13 7.5	6 54 59	31.71182	347 46 47.75	+1.52	12.51	41.0	25 44 18.6
30	S.	6 11 49.0	6 49 45	30.71545	347 50 12.88	—0.24	12.41	14.0	25 47 14.2
Dec. 4	S.	6 6 6.5	6 28 20	26.73033	348 2 38.13	—3.52	12.23	13.3	25 59 35.7
9	N.	5 58 5.5	6 0 41	21.74952	348 15 44.00	—1.76	12.06	38.3	26 13 8.5
14	S.	5 49 28.0	5 32 25	16.76915	348 25 45.25	—2.08	11.95	11.4	26 22 42.6
15	N.	5 47 42.5	5 26 44	15.77310	348 27 8.88	—0.72	11.99	39.1	26 24 35.3
16	S.	5 45 57.0	5 21 3	14.77705	348 28 39.25	—1.44	11.85	11.8	26 25 37.8
17	N.	5 44 11.6	5 15 22	13.78100	348 29 42.25	+0.08	11.77	40.1	26 27 10.7
19	N.	5 40 42.2	5 4 1	11.78888	348 31 42.38	—1.20	11.68	38.3	26 29 7.8
21	N.	5 37 16.1	4 52 44	9.79671	348 33 4.63	—2.40	11.61	38.6	26 30 29.2
22	S.	5 35 34.9	4 47 7	8.80061	348 33 36.50	0.00	11.66	12.3	26 30 37.1
23	N.	5 33 55.1	4 41 31	7.80450	348 33 44.25	+0.96	11.57	39.8	26 31 13.4
24	S.	5 32 17.0	4 35 58	6 80836	348 34 4.25	+0.80	11.53	12.0	26 31 5.5
28	S.	5 26 5.1	4 14 3	2.82358	348 33 30.13	—0.88	11.45	14.0	26 30 31.8
29	N.	5 24 38.0	4 8 40	— 1.82731	348 32 57.63	—1.04	11.50	40.7	26 30 25.8
1850.—Jan. 1	N.	5 20 33.0	3 52 49	+ 1.16168	348 31 9.63	—1.20	11.63	40.7	26 28 37.5
2	S.	5 19 17.1	3 47 37	2.15807	348 30 34.00	—0.64	11.75	12.4	26 27 34.0
3	N.	5 18 4.4	3 42 28	3.15449	348 29 38.13	—1.04	11.70	40.3	26 27 5.7
5	N.	5 15 48.5	3 32 21	5.14746	348 27 50.88	—2.64	11.79	40.8	26 25 17.2
6	S.	5 14 45.5	3 27 22	6.14400	348 26 57.00	+0.72	11.84	14.2	26 24 0.1
8	S.	5 12 49.9	3 17 35	8.13721	348 24 54.25	—0.08	11.85	14.9	26 21 57.2
10	S.	5 11 8.3	3 8 2	10.13058	348 22 46.75	+1.52	11.84	12.8	26 19 49.2
15	N.	5 7 57.8	2 45 13	15.11473	348 18 21.50	+0.16	12.07	40.0	26 15 49.6
19	N.	5 6 31.0	2 28 3	19.10281	348 13 32.25	—1.20	11.89	39.7	26 10 58.9
26	S.	5 6 14.7	2 0 15	26.08351	348 8 25.00	+0.24	12.30	14.1	26 5 27.0
27	N.	5 6 25.8	1 56 30	27.08090	348 7 33.88	+0.72	11.93	41.6	26 5 9.3
29	N.	5 6 57.3	1 49 10	29.07581	348 6 39.25	+0.88	12.44	39.1	26 4 6.8
Feb. 1	S.	5 8 7.6	1 38 32	32.06843	348 5 41.13	+0.88	12.85	38.8	26 2 40.7
2	S.	5 8 36.9	1 35 6	33.06604	348 5 17.38	+0.64	12.40	13.0	26 2 18.6
3	N.	5 9 9.1	1 31 42	34.06368	348 4 51.50	—0.56	12.35	40.6	26 2 19.2
4	S.	5 9 44.2	1 28 21	35.06135	348 4 49.13	+0.08	12.22	12.0	26 1 49.0
5	N.	5 10 21.9	1 25 3	36.05906	348 4 24.75	—0.08	12.20	39.7	26 1 52.2
10	S.	5 14 10.6	1 9 11	+41.04804	348 4 1.75	+1.36	12.26	13.3	+26 1 4.1

These eight series include all the materials available for our purpose, which are derived from observations of *Mars* during the opposition of 1849-50, and we pass to the second series of observations during the opposition of 1851-2.

II.—SECOND SERIES OF OBSERVATIONS OF MARS.

We have seven sets of observations during this opposition, instead of eight, as in the first series, there having been no observations at Athens or Cambridge, nor with the equatorial at the Cape of Good Hope, while, on the other hand, the prompt repair and return of the eye-piece had restored Lieut. Gilliss's meridian-circle to usefulness, and the *Astronomische Nachrichten*, xxxv, p. 269, affords a series of meridian observations at Kremsmünster.

Apparent places of stars compared with Mars during the second series of observations.

No.	Date.	Reduction in α.	Reduction in δ.	Apparent α.	Apparent δ.
		s.	″	h. m. s.	° ′ ″
47	1852.—Mar. 3	+0.40	−1.64	7 46 36	+24 44 49.1
	7	0.35	1.37	46 36	49.4
48	Mar. 6	+0.36	−1.49	7 46 57	+24 36 47.1
	11	0.29	1.19	46 57	47.4
49	Feb. 24	+0.49	−2.06	7 47 6	+25 3 0.6
	28	0.45	1.81	47 6	0.9
52	Feb. 27	+0.47	−1.92	7 48 38	+24 54 9.3
	Mar. 1	0.43	1.75	48 38	9.5
	4	0.39	1.54	48 38	9.7
54	Mar. 10	+0.33	−1.31	7 50 59	+24 28 25.8
	14	0.28	1.07	50 59	26.1
55	Mar. 13	+0.28	−1.18	7 52 38	+24 18 57.5
	15	0.26	1.06	52 38	57.6
57	Feb. 14	+0.58	−2.76	7 55 4	+25 0 18.1
	19	0.55	2.47	55 4	18.4
	24	0.52	2.16	55 4	18.7
	29	0.47	1.84	55 3	19.1
	Mar. 5	0.41	1.51	55 3	19.4
	10	0.35	1.20	55 3	19.7
58	Feb. 10	+0.59	−2.99	7 55 16	+24 55 7.2
	13	0.58	2.83	55 16	7.3
	15	0.57	2.73	55 16	7.4
60	Feb. 9	+0.60	−3.12	7 59 25	+24 52 38.7
	12	0.59	2.96	59 25	38.9
62	Feb. 6	+0.61	−3.37	8 6 17	+24 46 56.8
	10	0.61	3.17	6 17	57.0
63	June 7	−0.78	+1.18	8 10 13	+24 57 4.2
	11	0.79	1.20	10 13	4.2
65	Sept. 5	+0.17	+0.27	8 11 51	+15 55 48.3
	8	0.24	0.14	11 51	48.6
67	Sept. 7	+0.20	+0.32	8 14 59	+15 44 33.8
	9	0.25	0.23	14 59	33.7
69	Jan. 27	+0.56	−3.91	8 16 37	+24 1 28.1
	29	0.58	3.85	16 37	28.1
71	Jan. 29	+0.58	−3.89	8 19 48	+24 9 36.6
	Feb. 1	0.60	3.80	19 48	36.7
72	Jan. 29	+0.58	−3.89	8 19 51	+24 19 39.2
	Feb. 2	0.60	3.76	19 51	39.3
73	Jan. 28	+0.57	−3.91	8 20 56	+24 5 27.0
	30	0.59	3.88	20 56	27.0
77	Jan. 26	+0.55	−4.07	8 27 33	+23 58 1.4
	28	0.57	4.03	27 33	1.5
78	Jan. 22	+0.50	−4.13	8 28 3	+23 34 13.1
	24	0.54	4.11	28 4	13.1
79	Jan. 23	+0.52	−4.12	8 28 16	+23 45 33.9
	27	0.56	4 06	28 16	33.9
80	Jan. 21	+0.49	−4.15	8 30 12	+23 24 17.3
	23	0.51	4.13	30 13	17.3
82	Jan. 20	+0.48	−4.17	8 31 41	+23 16 7.6
	22	0.50	4.16	31 42	7.6

No.	Date.	Reduction in α.	Reduction in δ.	Apparent α.	Apparent δ.
		s.	″	h. m. s.	° ′ ″
85	1852.—Jan. 19	+0.46	−4.19	8 35 7	+23 14 27.5
	21	0.49	4.19	35 7	27.5
87	Jan. 15	+0.39	−4.16	8 40 18	+22 44 37.9
	17	0.42	4.18	40 18	37.9
88	Jan. 13	+0.34	−4.14	8 44 15	+22 33 29.6
	15	0.38	4.16	44 15	29.6
89	Jan. 16	+0.39	−4.22	8 45 28	+22 51 33.8
	18	0.42	4.24	45 28	33.7
90	Jan. 12	+0.32	−4.08	8 45 58	+22 22 40.8
	14	0.36	4.14	45 58	40.8
91	Jan. 11	+0.30	−4.05	8 47 26	+22 15 12.4
	13	0.34	4.12	47 26	12.3
92	Jan. 10	+0.28	−4.01	8 47 33	+22 8 43.1
	12	0.32	4.08	47 33	43.0
93	Jan. 8	+0.23	−3.91	8 48 54	+21 54 53.9
	10	0.27	3.98	48 54	53.8
94	Jan. 6	+0.18	−3.78	8 50 26	+21 44 9.4
	9	0.25	3.92	50 26	9.2
95	Jan. 9	+0.24	−3.97	8 52 13	+22 2 25.3
	11	0.29	4.04	52 13	25.2
96	Jan. 5	+0.15	−3.71	8 53 47	+21 34 4.8
	7	0.20	3.83	53 47	4.7
97	Jan. 1	+0.04	−3.37	8 58 16	+21 6 19.5
	3	0.09	3.51	58 16	19.4
98	Jan. 4	+0.11	−3.64	8 59 27	+21 29 18.0
	6	0.16	3.75	59 27	17.9
99	1851.—Dec. 30	−0.01	−3.18	9 3 20	+20 57 18.2
	1852.—Jan. 2	+0.05	3.41	3 20	18.0
100	Jan. 1	+0.02	−3.36	9 3 20	+21 1 43.4
	2	0.05	3.44	3 20	43.4
101	Jan. 3	+0.07	−3.53	9 4 16	+21 16 47.7
	5	0.12	3.65	4 16	47.6
102	1851.—Dec. 27	+3.25	−17.30	9 4 26	+20 37 35.7
	29	3.31	17.48	4 26	35.5
103	Dec. 18	+3.05	−16.41	9 7 25	+19 51 29.3
	20	3.11	16.58	7 25	29.1
104	Dec. 28	+3.32	−17.57	9 7 40	+20 41 6.2
	31	3.40	17.82	7 40	5.9
105	Dec. 25	+3.23	−17.26	9 7 42	+20 27 42.7
	29	3.34	17 61	7 42	42.3
106	Dec. 18	+3.01	−16.42	9 8 14	+19 52 9.8
	20	3.07	16.64	8 14	9.6
107	Dec. 23	+3.17	−17.04	9 8 14	+20 15 31.6
	26	3.25	17.33	8 14	31.3
108	Dec. 19	+3.03	−16.67	9 10 21	+20 2 23.1
	23	3.15	17.09	10 21	22.6
109	Dec. 15	+2.89	−16.21	9 12 17	+19 42 49.3
	17	2.95	16.44	12 17	49.1

A.—OBSERVATIONS OF MARS II, WITH THE SANTIAGO EQUATORIAL.

The following corrections have been made to the printed observations:

Page				
90	Dec.	20	No. 37,	*for* .79 *read* 8.79.
106		31	15,	Micr. $=-5''.69$ has been used instead of -5.31, on the assumption that the complementary decimal was inadvertently read off from the micrometer head. This gives $\Delta\delta = 11r.57\frac{1}{2}$.
129	Jan.	17	29,	*for* 2*h*. 8*m*. 7*s*.74, *read* 8*h*. 8*m*. 7*s*.74.
137		24	4,	The $\Delta\delta$ 21*r*.29 seems to have been accidentally written instead of 22*r*.29, and this hypothesis was evidently made in taking the printed mean, although the original MS. gives the micrometer-reading as printed. This assumption of an error of 1*r*. has been made in the computation, and the printed mean therefore employed.
138		24	38,	*for* 22.11 *read* 22.01.
153,4,5,	Feb.	2		$\Delta\delta$ should be positive.
166			line 1,	*for* Feb. 12 *read* Feb. 13.
209	Mar.	14	No. 14,	" —1.18 " —7.18.
212		15	68,	" 0.78½ " 0.79½.

The corresponing changes in the tables of results will then be:

Page			line				
88,	December	19	2	*for*	2′ 8″.01,	*read*	2′ 8″.11.
			4	"	2 12 .89,	"	2 12 .86.
107,		31	1	"	11*r*. 269 = 3′ 39.″68	"	11*r*. 277 = 3′ 39″.79.
			6	"	0. 826 = 16.″10	"	0. 818 = 15″.94.
			9	"	13″.60	"	13″.44.
116,	January	8	1	"	2′ 44″.95	"	2′ 44″.85.
			2	"	2 30. 60	"	2 30. 70.
127,		14	1,2	"	Fourteen	"	Eighteen.
			2	"	3′ 1″. 48	"	3′ 1″. 07.
			6	"	17″. 03	"	17″. 44.
137,		23	2	"	5*r*.131 = −1′ 40″. 00	"	5*r*. 151 = −1′ 40″.40.
			6	"	0.941 = 18″. 34	"	0. 921 = 17″94.
			9	"	14.″74	"	14.″34.
139,		24	1	"	21*r*.771 = 7′ 4″.32	"	21*r*.766 = 7′ 4″.23.
			2	"	20.837 = 6 46. 11	"	20.793 = 6 45.26.
141,		25	2	"	2.560 = 0 49.89	"	2.618 = 0 51.03.
142,			6	"	0.069 = 18″.89	"	0.911 = 17″. 75.
			9	"	16″. 27	"	16″. 13.
151,		31	1	"	−8*r*. 888 = 2′53″ 23	"	8*r* 885 = 2′53″16.
			6	"	0. 835 = 16″. 27	"	0.832 = 16″.21.
			9	"	13″. 18	"	13″. 12.
153,	February	1	2	"	−11.060 = 3′ 35″.56	"	−11.058 = 3′ 35″.52.
			6	"	15″.49	"	15″. 47.
			9	"	13″.27	"	.13″. 25.
155,		2	1,2		$\Delta\delta$ should be positive.		
157,		3	6	*for*	15″.70	*read*	15″.67.
162,		9	2	"	7.267 = 2′ 21″.63	"	7.268 = 2′ 21″.65.
			4	"	2′17″.55	"	2′ 17″.56.
176,		20	2	"	8.264 = 2′41″.06	"	8.270 = 2′41″. 18.
			6	"	13″.72	"	13″. 84
			9	"	11.51	"	13.63.
178,		21	1	"	7*r*.460 = 2′ 25″.30	"	7*r*.452 = 2′ 25″.24.
181,		24	10	"	0″.0	"	0″.06.
184,		26	1	"	9*r*.915	"	9*r*.914.
207,	March	12	3	"	0*r*.147	"	0*r*.146.
213,		15	1,2		$\Delta\delta$ should be negative.		
			2	*for*	0.533	*read*	0.534.

MARS II.

Observations with the Santiago Equatorial.

Date.	Obs. part.	Santiago S.T.	Wash. M.T.	$t-T$.	Star No.	Star's δ.	Meas'd $D\delta$.	Refr.	Obs'd δ.	No. comp. N.	No. comp. S.
		h. m. s.	h. m. s.	d.		° ′ ″	′ ″	′	° ′ ″		
1851.—Dec. 16	N. S.	7 43 43.76	13 36 38.24	— 45.43289	109	+ 19 42 49.18	+ 1 35.31	0.09	+ 19 44 24.58	10	10
	N. S.	8 46 11.00	14 38 55.24	45.38964	109	42 49.18	+ 1 41.83	.08	44 31.09	1	2
19	N. S.	7 31 4.22	13 12 13.04	42.44985	106	19 52 9.67	+ 1 58.08	.11	54 7.86	10	10
	N. S.	8 14 36.40	13 55 38.09	42.41970	106	52 9.67	+ 2 4.99	.09	54 14.75	5	5
	N. S.	8 39 0.67	14 19 58.36	42.40280	106	52 9.67	+ 2 8.78	.10	54 18.55	3	3
20	S.	7 47 29.09	13 24 39.31	41.44121	108	20 2 22.95	— 4 36.23	.23	57 46.49		20
21	S.	7 42 52.93	13 16 7.99	40.44713	108	2 22.85	— 37.87	.04	20 1 44.94		32
22	S.	7 37 43.55	13 7 3.55	39.45343	108	2 22.75	+ 3 33.94	.18	5 56.87		27
24	S.	8 7 51.50	13 29 14.73	37.43802	107	20 15 31.50	— 24.52	.02	15 6.96		32
25	S.	8 9 57.45	13 27 24.42	36.43930	107	15 31.40	+ 4 29.10	.22	20 0.72		20
26	S.	7 28 47.18	12 42 24.98	35.47054	105	20 27 42.57	— 2 46.93	.15	24 55.49		24
	S.	8 32 56.91	13 46 24.21	35.42611	105	27 42.57	— 2 33.17	.12	25 9.28		8
27	S.	7 44 37.59	12 54 16.90	34.46230	105	27 42 48	+ 2 33.46	.16	30 16.10		26
28	N. S.	7 58 48.63	13 4 29.70	33.45521	102	20 37 35.56	— 1 37.74	.08	35 57.74	21	20
29	N. S.	7 32 4.18	12 33 53.71	32.47646	104	20 41 6.08	+ 27.65	.02	41 33.75	9	9
30	N. S.	7 36 7.82	12 34 0.78	31.47638	104	41 5.99	+ 6 22.80	.33	47 29.12	10	10
31	N. S.	7 30 6.94	12 24 4.98	30.48328	99	20 57 18.15	— 3 47.76	.20	53 30.19	13	14
1852.—Jan. 1	N. S.	7 53 50.28	12 43 48.52	29.46958	100	21 1 43.43	— 1 53.61	.09	59 49.73	15	15
2	N. S.	7 33 31.20	12 19 36.86	28.48638	97	21 6 19.42	— 14.91	.01	21 6 4.50	16	16
4	N. S.	7 32 9.06	12 10 23.15	26.49279	101	21 16 47.63	+ 2 30.43	.13	19 18.19	8	8
5	N. S.	7 44 23.75	12 18 39.89	25.48704	98	21 29 17.95	— 3 12.27	.17	26 5.51	10	10
6	N. S.	7 58 20.19	12 28 38.13	24.48011	96	21 34 4.77	— 1 0.44	.05	33 4.28	8	8
7	N. S.	7 47 37.47	12 14 1.25	23.49026	94	21 44 9.31	— 4 11.03	.22	39 58.06	8	8
8	N. S.	6 54 13.74	11 16 50.36	22.52997	94	44 9.27	+ 2 37.78	.16	46 47.21	5	5
	N. S.	8 6 57.46	12 29 22.17	22.47960	94	44 9.27	+ 3 0.32	.15	47 19.74	6	6
9	N. S.	7 42 27.41	12 1 0.22	21.49930	93	21 54 53.86	— 44.06	.04	54 9.76	10	10
10	N. S.	7 46 36.52	12 1 12.73	20.49916	95	22 2 25.24	— 1 1.81	.05	22 1 23.38	23	23
11	N. S.	8 18 16.02	12 28 51.13	19.47996	92	22 8 43.02	+ 3.45	.00	8 46.47	5	5
12	N. S.	7 22 21.12	11 29 9.49	18.52142	91	22 15 12.36	+ 32.94	.03	15 45.33	12	12
	N. S.	8 25 0.27	12 31 38.38	18.47803	91	15 12.36	+ 52.44	.04	16 4.84	3	3
13	N. S.	8 2 30.77	12 5 16.65	17.49634	90	22 22 40.79	+ 31.41	.02	23 12.22	12	12
14	N. S.	7 46 39.03	11 45 31.59	16.51005	88	22 33 29.59	— 3 9.76	.17	30 19.66	18	18
16	N. S.	7 32 33.61	11 23 36.66	14.52528	87	22 44 37.90	+ 2.17	.00	44 40.07	12	12
17	N. S.	7 22 19.50	11 9 28.31	13.53509	89	22 51 33.75	+ 9.29	.01	51 43.05	8	8
20	N. S.	7 25 28.33	11 0 48.90	10.54110	85	23 14 27.45	— 1 55.38	.10	23 12 31.97	18	18
	N. S.	8 40 58.43	12 16 6.63	10.48881	85	14 27.45	— 1 33.75	.08	12 53.62	12	12
21	N. S.	6 59 36.29	10 31 5.19	9.56174	82	23 16 7.63	+ 2 57.41	.18	19 5.22	2	2
22	N. S.	8 9 10.32	11 36 31.91	8.51630	80	23 24 17.31	+ 1 44.78	.10	26 2.19	13	13
23	N. S.	8 2 29.64	11 25 56.41	7.52365	78	23 34 13.08	— 1 49.30	.11	32 23.67	13	13
24	N. S.	8 2 48.04	11 22 18.85	6.52617	79	23 45 33.88	— 6 54.67	.39	38 38.82	23	23
25	N. S.	7 18 58.17	10 34 40.25	5.55926	79	45 33.89	— 59.91	.06	44 33.92	17	17
27	N. S.	7 34 50.65	10 42 38.31	3.55372	77	23 58 1.45	— 1 51.71	.11	56 9.63	15	15
28	N. S.	7 54 14.57	10 58 3.14	2.54302	69	24 1 28.11	+ 16.61	.01	24 1 44.73	9	9
29	N. S.	8 3 41.99	11 3 33.11	1.53920	73	24 5 27.00	+ 2 53.82	.16	8 20.98	19	20
30	N. S.	8 11 2.11	11 6 56.11	— 0.53685	71	24 9 36.65	+ 2 29.84	.14	12 6.63	25	25
31	N. S.	8 6 37.72	10 58 36.54	+ 0.45737	72	24 19 39.28	— 2 45.00	.16	16 54.12	13	13
Feb. 1	N. S.	7 14 13.48	10 2 24.97	1.41835	68	24 25 1.59	— 3 43.29	.22	21 18.08	14	14
2	N. S.	8 6 34.80	10 50 41.81	2.45187	68	25 1.62	+ 46.54	.04	25 48.20	15	15
3	N. S.	8 35 55.75	11 16 2.03	3.46947	66	24 29 18.89	+ 38.56	.04	29 57.49	15	15
7	N. S.	7 35 27.43	10 0 0.00	7.41667	62	24 46 56.88	— 3 14.17	.19	43 42.52	13	13
8	N. S.	7 13 9.65	9 33 49.96	8.39850	62	46 56.93	— 23.22	.02	46 33.69	14	15
9	N. S.	7 10 7.96	9 26 52.85	9.39367	62	46 56.98	+ 2 13.85	.13	49 10.96	8	8
	N. S.	8 49 53.86	11 6 22.40	9.46276	62	46 56.98	+ 2 24.52	.14	49 21.64	2	3
10	N. S.	7 39 48.89	9 52 33.01	10.41149	60	24 52 38.76	— 1 1.91	.06	51 36.79	9	9
11	N. S.	7 31 1.54	9 39 51.19	11.40268	60	52 38.81	+ 1 6.43	.06	53 45.30	1	2
	N. S.	8 45 5.37	10 53 42.88	11.45397	60	52 38.81	+ 1 12.55	.07	53 51.43	4	3
13	N. S.	7 29 12.17	9 30 10.30	13.39595	58	24 55 7.33	+ 2 12.03	.13	57 19.49	3	3
	N. S.	8 37 12.00	10 37 58.99	13.44304	58	55 7.33	+ 2 16.84	.14	57 24.31	2	2
14	N. S.	8 46 5.47	9 43 4.92	14.40492	57	25 0 18.13	— 1 31.90	.09	58 46.14	9	9
15	N. S.	7 0 17.45	8 53 28.49	+ 15.37047	57	0 18.19	— 21.13	0.02	59 57.04	9	9

Observations with the Santiago Equatorial—Continued.

Date.	Obs. part.	Santiago S.T.	Wash. M.T.	$t-T$.	Star No.	Star's δ.	Meas'd $D\delta$.	Refr.	Obs'd δ.	No. comp. N.	No. comp. S.
		h. m. s.	h. m. s.	d.		° ′ ″	′ ″	″	° ′ ″		
1852.—Feb. 16	N. S.	7 28 12.88	9 17 23.45	+ 16.38708	57	+ 25 0 18.25	+ 40.50	0.04	+25 0 58.79	15	15
17	N. S.	7 30 24.80	9 15 39.10	17.38587	57	0 18.34	+ 1 27.86	08	1 46.28	24	24
19	N. S.	7 12 56.96	8 50 22.30	19.36831	57	0 18.42	+ 2 24.88	14	2 43.44	8	9
20	N. S.	7 16 43.08	8 50 11.90	20.36819	57	0 18.48	+ 2 34.31	15	2 52.94	15	15
21	N. S.	7 29 1.81	8 58 32.70	21.37399	57	0 18.54	+ 2 32.24	15	2 50.93	13	13
22	N. S.	7 7 11.29	8 32 49.85	22.35613	57	0 18.60	+ 2 18.88	14	2 37.62	4	4
23	N. S.	7 3 42.05	8 25 25.27	23.35099	57	0 18.66	+ 1 54.74	11	2 13.51	11	11
24	N. S.	7 1 40.35	8 19 28.00	24.34685	57	0 18.73	+ 1 19.14	07	1 37.94	11	11
25	N. S.	7 9 5.18	8 22 55.71	25.34926	49	25 3 0.69	— 2 9.91	13	0 50.65	12	12
26	N. S.	7 11 52.74	8 21 46.90	26.34846	49	3 0.75	— 3 6.59	19	24 59 53.97	12	12
27	N. S.	8 27 18.13	9 33 4.03	27.39796	49	3 0.81	— 4 14.55	25	58 46.01	9	9
28	N. S.	6 51 42.57	7 53 48.23	28.32903	52	24 54 9.36	+ 3 24.85	21	57 34.42	7	7
	N. S.	8 11 24.86	9 13 17.46	28.38423	52	54 9.36	+ 3 21.31	20	57 30.87	6	6
29	N. S.	6 44 2.27	7 42 13.28	29.32099	52	54 9.41	+ 2 1.07	12	56 10.60	6	6
Mar. 1	N. S.	6 59 13.51	7 53 26.12	30.32877	52	24 54 9.47	+ 25.57	03	24 54 35.07	19	19
2	N. S.	7 15 4.17	8 5 18.28	31.33702	52	54 9.53	— 1 18.96	08	52 50.49	30	30
3	N. S.	6 50 12.48	7 36 34.76	32.31707	52	54 9.59	— 3 9.31	20	51 0.08	13	13
4	N. S.	7 19 35.94	8 1 57.49	33.33469	47	24 44 49.15	+ 4 11.93	25	49 1.33	11	11
6	N. S.	7 36 48.15	8 11 15.07	35.34115	47	44 49.29	— 14.70	01	44 34.58	12	12
7	N. S.	7 16 20.97	7 46 55.33	36.32455	48	24 36 47.11	+ 5 26.77	33	42 14.21	7	7
8	N. S.	7 24 47.03	7 51 24.10	37.32736	48	36 47.17	+ 2 53.80	18	39 41.15	12	12
9	N. S.	7 16 54.31	7 39 36.77	38.31918	48	36 47.23	+ 15.72	01	37 2.96	9	10
10	N. S.	6 57 38.52	7 16 28.23	39.30310	48	36 47.30	— 2 29.44	16	34 17.70	4	5
11	N. S.	7 29 36.35	7 44 24.91	40.32251	54	24 28 25.88	+ 2 59.86	18	31 25.92	14	14
12	N. S.	6 45 13.66	6 56 13.58	41.28905	54	28 25.94	+ 4.03	00	28 29.97	5	5
	N. S.	7 40 30.81	7 51 21.68	41.32734	54	28 25.94	— 3.12	00	28 22.82	15	13
13	N. S.	7 21 1.07	7 27 59.23	42.31110	54	28 26.00	— 3 7.92	18	25 17.90	15	15
14	N. S.	7 31 37.04	7 34 37.76	43.31572	55	24 18 57.55	+ 3 5.51	18	22 3.24	13	13
15	N. S.	7 31 24.00	7 30 28.64	+ 44.31283	55	18 57.61	— 15.96	0.01	18 41.64	20	20

B.—OBSERVATIONS OF MARS II. WITH THE SANTIAGO MERIDIAN-CIRCLE.

The only remarks needed, relative to this series, are these:

Page 309, note *k*, *for* 1′ 21″.30 *read* 1′ 21″.27.
311, the observation N°. 7 has not been used.
312, Jan. 28. *For* 24° 28′ 56″.97 *read* 24° 28′ 53″.97.
312, Feb. 1. The sign of Nadir-reading should be positive.
313, note *l*. The star is measured from Bessel 341.
314, *f* and *g*. Reference-letters should be transposed.
318, Mar. 23. *For* 24° 33′ 35″.04 *read* 22° 33′ 35″.04.

The observations in this series are of two classes: the first, consisting of microscope-readings after setting the fixed thread upon the limb of the planet; the second, of micrometric differences from some near star. The latter cases are indicated in the foot-notes. This second class of observations has been treated like the micrometric measurements; with the equatorial and the measured differences applied to the star-place, not as it was observed on that day, but as derived from our General Catalogue. This being kept in view, we deduce the appended table, in which the semi-diameter is not applied; inasmuch as this is derived from computation, and incorporated in the *computed* place of the observed limb.

MARS II.

Observations with the Santiago Meridian-Circle.

Date.	Limb.	Sant. S.T.	Wash. M.T.	Obs'd δ.	Circle-reading.	Refr.	Nadir.	$t-T$.
		h. m. s.	h. m. s.	° ′ ″	° ′ ″	′ ″	″	d.
1851.—Dec. 19	S.	9 9 9.18	14 50 1.93	+19 54 14.48				—42.381923
21	S.	9 8 37.91	14 41 38.92	20 1 58.46	306 32 34.92	—1 13.57	+14.3	40.387745
22	S.	9 8 17.01	14 37 22.17	20 6 9.65	306 28 24.27	1 12.24	10.9	39.390716
24	S.	9 7 25.62	14 28 39.09	20 15 18.70	306 19 18.15	1 13.34	10.6	37.396771
25	S.	9 6 54.84	14 24 12.48	20 20 7.74	306 14 27.10	1 12.93	12.2	36.399856
26	S.	9 6 20.40	14 19 42.22	20 25 15.99	306 9 20.68	1 12.66	10.1	35.402984
27	S.	9 5 42.75	14 15 8.77	20 30 34.01	306 4 5.00	1 13.60	8.7	34.406148
28	S.	9 5 1.37	14 10 31.59	20 36 4.08	305 58 43.92	1 14.29	0.4	33.409357
30	S.	9 3 29.31	14 1 7.95	20 47 42.31	305 46 57.65	1 14.55	8.7	31.415881
31	S.	9 2 38.29	13 56 21.17	20 53 47.01	305 40 52.18	1 14.18	9.1	30.419198
1852.—Jan. 1	N.	9 1 43.93	13 51 31.04	21 0 21.13	305 34 17.00	1 14.42	10.4	29.422556
2	N.	9 0 45.43	13 46 36.79	21 6 38.13				28.425963
4	N.	8 58 40.94	13 36 40.82	21 19 51.11	305 14 53.88	1 16.28	5.4	26.432859
5	N.	8 57 33.99	13 31 38.14	21 26 29.69	305 8 14.92	1 16.00	5.5	25.436363
6	S.	8 56 25.42	13 26 33.84	21 33 13.39				24.439886
7	S.	8 55 11.63	13 21 24.34	21 40 12 21	304 54 26.25	1 16.75	12.4	23.443468
8	N.	8 53 56.05	13 16 13.06	21 47 31.22				22.447071
9	S.	8 52 39.16	13 11 0.47	21 54 24.12				21.450688
10	N.	8 51 17.59	13 5 43.21	22 1 50.48	304 32 46.75	1 17.32	+14.2	20.454361
11	N.	8 49 55.37	13 0 25.30	22 9 5.65				19.458040
12	S.	8 48 28.55	12 55 2.81	22 16 2.49	304 18 50.80	1 18.68	—0.5	18.461773
13	N.	8 47 0.66	12 49 39.25	22 23 35.18				17.465518
14	S.	8 45 31.85	12 44 14.77	22 30 30.43				16.469272
15	N.	8 43 58.98	12 38 46.24	22 38 0.58	303 56 54.72	1 19.49	1.7	15.473076
16	S.	8 42 26.57	12 33 18.17	22 44 56.64	303 49 59.78	1 19.31	3.0	14.476872
17	N.	8 40 50.23	12 27 46.18	22 52 16.98	303 42 38.58	1 19.35	—2.1	13.480715
18	S.	8 39 14.93	12 22 15.24	22 58 58.82	303 35 54.70	1 20.31	+0.9	12.484545
19	N.	8 37 35.91	12 16 40.57	23 6 7.34	303 28 45.82	1 20.35	+1.3	11.488419
20	N.	8 35 58.75	12 11 7.76	23 13 3.22	303 21 52.12	1 20.63	—0.6	10.492270
21	N.	8 34 17.56	12 5 30.95	23 19 44.54	303 15 11.25	1 21.28	—0.4	9.496170
22	S.	8 32 38.83	11 59 56.57	23 25 56.35	303 8 55.80	1 21.64	+3.6	8.500037
23	N.	8 30 56.90	11 54 19.01	23 32 43.25	303 2 12.02	1 22.16	+1.0	7.503947
24	S.	8 29 17.10	11 48 43.58	23 38 41.07				6.507829
25	N.	8 27 33.77	11 43 4.61	23 45 0.22	302 49 56.98	1 22.59	—0.5	5.511753
27	N.	8 24 14.53	11 31 54.10	23 56 34.03	302 38 22.82	1 22.84	+0.1	3.519513
28	S.	8 22 36.05	11 26 19.97	24 1 41.42	302 33 12.45	1 23.26	3.5	2.523371
29	N.	8 20 56.05	11 20 44.34	24 7 12.70	302 27 45.58	1 24.59	0.4	1.527265
30	S.	8 19 19.54	11 15 12.18	24 12 2.91	302 22 54.82	1 24.25	+0.6	—0.531109
31	N.	8 17 41.86	11 9 38.86	24 17 5.37	302 17 53.55	1 23.61	—1.2	+0.465033
Feb. 1	S.	8 16 7.69	11 4 8.87	24 21 24.45	302 13 35.72	1 23.56	+2.5	1.461214
2	N.	8 14 32.97	10 58 38.67	24 25 58.54	302 8 56.83	1 23.56	+2.3	2.457393
3	S.	8 13 2.41	10 53 12.44	24 29 53.32				3.453616
4	N.	8 11 31.13	10 47 45.51	24 33 52.12	302 1 5.70	1 24.81	1.1	4.449833
7	S.	8 7 13.82	10 31 41.17	24 43 39.72				7.438672
8	S.	8 5 53.33	10 26 25.00	24 46 32.75	301 48 24.43	1 24.57	1.5	8.435012
9	N.	8 4 33.51	10 21 9.48	24 49 23.99	301 45 33.63	1 24.71	1.2	9.431360
10	S.	8 3 19.28	10 15 59.55	24 51 32.38	301 43 16.88	1 24.95	9.8	10.427774
11	N.	8 2 5.05	10 10 49.61	24 53 55.30				11.424185
13	N.	7 59 47.45	10 0 40.57	24 57 26.78	301 37 23.38	1 25.65	9.6	13.417137
14	N.	7 58 42.92	9 55 40.31	24 58 52.61				14.413661
15	N	7 57 41.71	9 50 43.35	25 0 6.58				15.410224
16	S.	7 56 44.76	9 45 50.65	25 0 54.88				16.406836
17	N.	7 55 49.07	9 40 59.21	25 1 54.75				17.403463
18	S.	7 54 58.40	9 36 12.77	25 2 14.55	301 32 41.23	1 27.67	6.0	18.400148
19	N.	7 54 10.46	9 31 29.05	25 2 53.31	301 32 3.75	1 26.45	3.5	19.396866
20	S.	7 53 25.31	9 26 48.12	25 2 47.09	301 32 10.33	1 26.21	2.9	20.393612
21	N.	7 52 43.12	9 22 10.13	25 2 58.01	301 31 54.95	1 25.25	6.4	21.390395
22	N.	7 52 4.84	9 17 36.05	25 2 43.90	301 32 13.42	1 25.91	2.7	22.387222
23	N.	7 51 30.67	9 13 6.06	25 2 17 96	301 32 38.12	1 26.57	4.6	23.384098
24	S.	7 51 0.53	9 8 40.10	+25 1 28.26	301 33 26.80	—1 25.65	+4.7	+24.381020

Observations with the Santiago Meridian-Circle—Continued.

Date.	Limb.	Sant. S.T.	Wash. M.T.	Obs'd δ.	Circle-reading.	Refr.	Nadir.	$t-T$.
		h. m. s.	h. m. s.	° ′ ″	° ′ ″	′ ″	″	d.
1852.—Feb. 25	N.	7 50 31.85	9 4 15.59	+25 1 0.09	301 33 57.43	—1 25.91	+4.5	+25.377959
26	S.	7 50 8.43	8 59 56.32	24 59 47.53				26.374957
27	N.	7 49 46.66	8 55 38.71	24 58 54.77				27.371975
28	S.	7 49 30.26	8 51 26.45	24 57 24.56	301 37 30.67	1 26.32	5.2	28.369056
29	N.	7 49 14.81	8 47 15.13	24 56 21.08				29.366147
Mar. 1	N.	7 49 4.99	8 43 9.43	24 54 23.73				30.363303
2	N.	7 48 56.85	8 39 5.41	24 53 1.57				31.360479
3	N.	7 48 52.42	8 35 5.08	24 51 5.69				32.357697
4	N.	7 48 51.23	8 31 7.98	24 49 4.51	301 45 49.02	1 24.72	5.3	33.354954
6	N.	7 48 57.93	8 23 22.86	24 44 41.48				35.349570
7	S.	7 49 7.03	8 19 36.02	24 42 1.37	301 52 52.30	1 25.06	5.5	36.346944
8	N.	7 49 17.47	8 15 50.53	24 39 45.78				37.344334
9	S.	7 49 32.18	8 12 9 29	24 36 54.23				38.341774
10	N.	7 49 48.37	8 8 29.53	24 34 17.74				39.339231
11	S.	7 50 8.58	8 4 53.77	24 31 14.36	302 3 39.88	1 24.63	4.5	40.336734
12	N.	7 50 30.59	8 1 19.98	24 28 27.80	302 6 25.75	1 23.84	4.4	41.334258
13	S.	7 50 56.74	7 57 50.14	24 25 8.82	302 9 44.50	1 23.21	4.0	42.331830
14	N.	7 51 24.03	7 54 21.31	24 22 5.66	302 12 48.12	1 23.17	3.5	43.329414
15	S.	7 51 55.24	7 50 56.52	+24 18 32.73	302 16 20.58	—1 24.00	+4.8	+44.327043

C.—OBSERVATIONS OF MARS II. WITH THE WASHINGTON EQUATORIAL.

The corrections applied are—

Page	379, January 24,	No. 4,	*for*	9*h*. 48*m*. 24*s*.67	*read*	9*h*. 45*m*. 24*s*.67.
	381, " 26,	" 21,	"	22*r*. 244	"	22*r*. 239
		Nos. 21 to 36,	"	9	"	10
	383, February 2,	No. 32,	"	2*r*. 365	"	2*r*. 373
	384, " 3,	" 10,	"	1*r*. 152	"	1*r*. 132
Results	385, " 3,	line 1,	"	1*r*. 244	"	1*r*. 242
		2,	"	19″. 12	"	19″. 09

We have then the observations—

MARS II.

Observations with the Washington Equatorial.

Date.	Obs. part.	Wash. S.T.	Wash. M.T.	$t-T$.	Star No.	Star's δ.	Meas. $D\delta$.	Refr.	Obs'd δ.	No. comp. N.	No. comp. S.
		h. m. s.	h. m. s.	d.		° ′ ″	′ ″	″	° ′ ″		
1852.—Jan. 24	N. S.	6 25 40.24	10 11 16.02	—6.57551	79	+23 45 33.87	—7 25.50	0.13	+23 38 8.24	5	7
26	N. S.	6 22 36.53	10 0 21.00	4.58309		23 44	+5 46.98	.10		9	9
30	N. S.	7 27 24.70	10 49 14.91	—0.54913		24 12	— 40.22	.01		4	4
Feb. 2	N. S.	6 36 51.43	9 47 2.20	+2.40766	68	24 25 1.62	+ 20.73	.00	24 25 22.35	8	8
3	N. S.	6 42 46.55	9 49 0.43	+3.40903	64	+24 28 59.71	+ 28.87	0.01	+24 29 28.59	9	9

The Greenwich volumes for 1851–52 give us—

D.—OBSERVATIONS OF MARS II. WITH THE GREENWICH TRANSIT-CIRCLE.

MARS II.

Observations with the Greenwich Transit-Circle.

Date.	Limb.	Green. S.T.	Wash. M.T.	$t-T$.	Circle-reading.	Refr.	Zenith corr.	Observed δ.
							+8′	
		h. m. s.	h. m. s.	d.	″	″	″	° ′ ″
1851.—Dec. 8	N. S.	9 8 3.89	10 50 39.2	− 53.54816	51.00	37.40	46.62	+ 19 28 28.20
26	C.	9 6 27.11	9 38 16.3	35.59842	5.78	37.17	46.83	20 24 8.44
1852.—Jan. 5	N. S.	8 57 47.85	8 50 20.2	25.63171	26.33	34.42	47.34	21 24 50.13
7	C.	8 55 26.62	8 40 6.7	23.63881	36.19	34.02	47.34	21 38 40.67
9	N. S.	8 52 54.36	8 29 43.0	21.64603	27.93	33.56	47.34	21 52 49.40
20	N. S.	8 36 17.33	7 29 53.6	10.68757	33.34	31.72	46.55	23 11 16.60
22	N. S.	8 32 57.69	7 18 42.7	8.69534	46.70	30.90	46.55	23 24 34.06
23	N. S.	8 31 17.19	7 13 6.6	7.69923	20.52	31.56	46.55	23 30 58.34
28	S.	8 22 54.93	6 45 6.2	2.71868	59.53	31.11	46.55	24 0 29.19
29	N. S.	8 21 15.98	6 39 31.6	1.72255	33.06	30.63	46.55	24 5 47.97
30	N. S.	8 19 38.16	6 33 58.1	− 0.72641	28.31	30.72	46.55	24 10 52.13
Feb. 3	N. S.	8 13 19.72	6 11 57.1	+ 3.25830	30.28	30.27	46.80	24 28 50.86
6	N. S.	8 8 54.50	5 55 44.8	6.24705	34.02	30.11	46.80	24 39 47.27
9	N. S.	8 4 49.93	5 39 53.2	9.23603	50.84	29.57	46.80	24 48 31.00
10	N. S.	8 3 33.42	5 34 41.0	10.23242	25.12	30.06	46.80	24 50 56.23
11	N. S.	8 2 19.95	5 29 31.8	11.22884	13.39	30.28	46.80	24 53 7.76
14	N. S.	7 58 56.03	5 14 20.6	14.21829	34.24	30.08	46.80	24 58 17.09
18	N. S.	7 55 7.83	4 54 49.4	18.20474	22.60	29.39	46.87	25 1 59.34
20	N. S.	7 53 33.79	4 45 23.8	20.19189	43.18	30.16	46.87	25 2 37.99
26	C.	7 50 12.78	4 18 27.9	26.17949	28.75	30.01	46.87	24 59 52.57
28	N. S.	7 49 33.01	4 9 56.5	28.17357	48.02	29.36	46.87	24 57 33.96
Mar. 2	N. S.	7 48 58.30	3 57 34.7	31.16498	25.27	29.82	46.45	24 52 56.67
3	N. S.	7 48 53.68	3 53 33.2	32.16219	14.94	30.36	46.45	24 51 6.44
4	N. S.	7 48 51.62	3 49 35.2	33.15944	11.51	30.90	46.45	24 49 9.35
5	C.	7 48 52.95	3 45 41.0	34.15672	18.88	31.15	46.45	24 47 1.73
6	S. N.	7 48 57.56	3 41 49.7	35.15404	31.82	31.00	46.45	24 44 48.94
8	C.	7 49 15.49	3 34 15.8	37.14879	24.36	30.52	46.45	24 39 56.88
9	C.	7 49 28.56	3 30 32.9	38.14621	2.56	30.43	46.45	24 37 18.77
12	C.	7 50 26.41	3 19 42.9	41.13869	37.12	30.76	46.45	24 28 43.88
17	C.	7 52 57.11	3 2 33.6	46.12678	13.97	31.08	45.52	24 12 7.64
18	C.	7 53 35.12	2 59 15.6	47.12449	51.74	30.88	45.52	24 8 30.07
20	C.	7 54 58.09	2 52 46.6	49.11998	30.03	30.96	45.52	24 0 51.70
22	C.	7 56 30.91	2 46 27.3	51.11559	34.02	30.45	45.52	23 52 48.22
23	C.	7 57 20.60	2 43 21.0	52.11344	45.67	30.27	45.52	23 48 36.75
25	C.	7 59 6.62	2 37 14.9	54.10920	23.69	31.35	45.52	23 39 57.65
27	C.	8 1 1.12	2 31 17.3	+ 56.10406	28.13	31.21	45.52	+23 30 53.35

From the Memoirs of the Royal Astronomical Society, volume XXI., we have—

E.—OBSERVATIONS OF MARS II. WITH THE CAPE MURAL-CIRCLE.

MARS II.

Observations with the Cape Mural-Circle.

Date.	Assumed Cape S. T.	Wash. M. T.	t—T.	Circle-reading.	Zenith point.	Refr.	Observed δ.
	h. m. s.	h. m. s.	d.	° ′ ″	° ′ 33 57 ″	′ ″	° ′ ″
1851—Dec. 22	9 8 22.2	8 42 11.8	−39.63736	339 56 59.41	0.53	1 18.89	+20 5 17.01
26	9 6 28.6	24 34.9	35.64960	38 7.14	0.95	1 19.14	20 24 9.95
29	9 4 27.9	10 46.7	32.65918	21 45.96	1.68	1 19.77	20 40 32.49
30	9 3 40.9	8 6 4.0	31.66245	15 53.11	0.81	1 17.89	20 46 22.59
1852—Jan. 1	9 1 57.1	7 56 28.6	29.66911	3 44.37	1.52	1 20.38	20 58 34.53
2	9 1 0.4	51 36.2	28.67250	338 57 24.82	1.55	1 21.69	21 4 55.42
3	9 0 0 4	46 40.4	27.67592	50 53.50	1.61	1 21.28	21 11 26.39
5	8 57 51.3	36 39.8	25.68287	37 31.89	2.33	1 21.64	21 24 49.08
9	8 52 58.0	16 3.7	21.69718	9 34.69	3.74	1 22.67	21 52 48.72
10	8 51 38.0	10 48.0	20.70083	2 25.47	3.42	1 24.46	21 59 59.41
12	8 48 50.4	7 0 9.0	18.70823	337 47 58.55	3.44	1 23.74	22 14 25.63
13	8 47 23.1	6 54 46.1	17.71197	40 45.75	3.63	1 24.82	22 21 39.70
14	8 45 53.7	49 21.0	16.71573	33 33.38	4.30	1 26.05	22 28 53.97
15	8 44 22.4	43 54.0	15.71951	26 19.33	4.14	1 25.65	22 36 7.46
16	8 42 49.3	38 25.3	14.72332	19 10.04	4.53	1 26.05	22 43 17.54
19	8 38 0.9	21 49.9	11.73484	336 58 5.41	5.70	1 26.66	23 4 23.95
20	8 36 22.3	16 15.7	10.73871	51 14.37	6.22	1 26.15	23 11 15.00
21	8 34 42.9	10 40.7	9.74258	44 33.34	5.81	1 27.65	23 17 57.12
22	8 33 2.8	6 5 4.9	8.74647	37 58.39	6.57	1 28.64	23 24 33.82
23	8 31 22.4	5 59 28.9	7.75036	31 32.15	6.97	1 28.85	23 31 0.67
24	8 29 41.6	53 52.4	6.75426	25 15.26	7.11	1 29.03	23 37 17.88
25	8 26 20.1	42 39.7	4.76204	13 16.18	8.35	1 29.44	23 49 18.61
27	8 24 39.7	37 3.7	3.76593	7 32.14	8.80	1 29.28	23 55 2.94
29	8 21 21.0	25 53.6	− 1.77369	335 56 45.56	9.37	1 30.81	24 5 51.62
Feb. 2	8 14 56.7	5 3 46.8	+ 2.21096	37 49.78	10.87	1 31.02	24 24 49.11
3	8 13 24.3	4 58 18.8	3.20716	33 42.08	10.79	1 31.03	24 28 56.74
4	8 11 53.7	52 42.5	4.20339	29 48.86	10.92	1 31.93	24 32 50.99
5	8 10 25.2	47 22.3	5.19963	26 9.72	11.58	1 31.98	24 36 30.84
6	8 8 58.8	42 6.2	6.19591	22 46.33	12.01	1 32.56	24 39 55.24
7	8 7 34.7	36 46.4	7.19220	19 36.67	12.26	1 32.66	24 43 5.25
9	8 4 53.7	26 14.0	9.18488	14 0.14	13.50	1 31.85	24 48 42.21
10	8 3 37.1	21 1.8	10.18127	11 35.68	14.59	1 32.35	24 51 8.26
11	8 2 23.2	15 52.8	11.17769	9 24.94	15.03	1 33.14	24 53 20.23
12	8 1 12.2	10 45.5	12.17414	7 28.26	15.29	1 32.54	24 55 16.57
13	8 0 4.1	5 41.6	13.17062	5 46.73	15.62	1 33.05	24 56 58.94
14	7 58 58.9	4 0 40.7	14.16714	4 17.26	16.31	1 32.79	24 58 28.84
16	7 56 58.2	3 50 48.5	16.16028	1 59.29	16.95	1 33.97	25 0 48.63
17	7 56 2.6	45 57.1	17.15691	1 7.70	17.30	1 32.63	25 1 39.23
18	7 55 10.3	41 9.1	18.15358	0 31.85	18.35	1 32.32	25 2 15.82
19	7 54 21.3	36 24.3	19.15028	0 8.56	18.67	1 33.51	25 2 40.62
20	7 53 35.7	31 42.9	20.14702	334 59 54.55	18.96	1 32.91	25 2 54.32
21	7 52 53.5	27 4.9	21.14381	59 56.21	19.68	1 31.79	25 2 52.26
23	7 51 39.3	17 59.1	23.13749	335 0 29.46	19.57	1 34.44	25 2 21.55
24	7 51 7.2	13 31.2	24.13439	1 1.64	20.58	1 33.03	25 1 48.97
25	7 50 38.7	3 9 6.9	25.13133	1 43.09	21.55	1 29.92	25 1 5.38
28	7 49 33.6	2 56 14.2	+28.12239	4 58.80	21.87	1 34.39	+24 57 54.46

And finally, from the *Astronomische Nachrichten*, No. 833—

F.—OBSERVATIONS OF MARS II. WITH THE KREMSMÜNSTER MERIDIAN-CIRCLE.

MARS II.

Observations with the Kremsmünster Meridian-Circle.

Date.	Kremsm. M. T.	Wash. M. T.	Observed α.	Observed δ.	$t—T$.
	h. m. s.	h. m. s.	h. m. s.	° ′ ″	d.
1852—Jan. 20	12 38 18.91	6 33 34.31	8 36 19.84	+23 11 8.64	—10.726686
24	12 15 55.21	6 11 10.61	8 29 38.95	23 37 9.22	— 6.742238
Feb. 8	10 53 32.34	4 48 47.74	8 6 10.72	24 45 49.51	+ 8.200553
9	10 48 17.33	4 43 32.73	8 4 51.53	24 48 29.94	9.196907
10	10 43 4.93	4 38 20.33	8 3 34.96	24 50 55.64	10.193291
24	9 35 34.89	3 30 50.29	7 51 5.85	25 1 34.31	24.146415
25	9 31 10.78	3 26 26.18	7 50 37.38	25 0 54.03	25.143358
26	9 26 50.46	3 22 5.86	7 50 12.33	24 59 55.86	26.140345
Mar. 6	8 50 10.50	2 45 25.90	7 48 56.04	24 44 58.97	35.114883
7	8 46 22.11	2 41 37.51	7 49 3.43	24 42 37.25	36.112239
8	8 42 36.23	2 37 51.63	7 49 13.80	24 40 3.54	37.109625
14	8 21 3.15	2 16 18.55	7 51 16.54	24 22 40.59	43.096659
16	8 14 13.92	2 9 29.32	7 52 19.33	24 15 52.30	45.089923

These complete our data, so far as *Mars* is concerned.

III. FIRST SERIES OF OBSERVATIONS OF VENUS.

The observations of *Venus* are, as has already been stated, far less numerous than those of *Mars;* and not only do the rich series garnered by Lieutenant Gilliss, at Santiago, find no corresponding comparisons on the same nights with the same star, but there are scarcely a sufficient total number of observations in the northern hemisphere for the deduction of trustworthy results, even by the circuitous and time-consuming methods which it has been found necessary to employ. Two hundred and one Santiago observations are to be compared with the seventy-four which can be obtained from northern observers. Of these, 83 are the results of micrometric comparisons at Santiago, and 118 are meridian determinations made there. The northern hemisphere furnishes, during the same two conjunctions, 22 micrometric observations at Washington, 34 meridian ones at Greenwich, two at Altona, and 16 at Cracow. From these we are to endeavor to extract the best determination of the parallax which they will afford.

Apparent places of stars compared with Venus during the first series of observations.

No.	Date.	Reduction in α.	Reduction in δ.	Apparent α.	Apparent δ.
		s.	″	h. m. s.	° ′ ″
110	1850.—Oct. 18	+0.92	+2.66	16 40 56	—26 28 25.3
	20	0.91	2.75	40 56	25.2
111	Oct. 19	+0.92	+2.71	16 42 57	—26 39 27.9
	21	0.90	2.80	42 57	27.8
112	Oct. 20	+0.93	+2.84	16 49 13	—26 52 17.9
	22	0.91	2.94	49 13	17.8
113	Oct. 20	+0.93	+2.84	16 50 6	—26 56 32.4
	22	0.91	2.94	50 6	32.3
114	Oct. 21	+0.93	+2.91	16 52 0	—27 1 14.8
	23	0.91	3.01	52 0	14.7
115	Oct. 22	+0.93	+3.03	16 54 43	—26 59 38.4
	24	0.94	3.13	54 43	38.3
116	Oct. 23	+0.94	+3.13	16 59 45	—27 11 44.2
	25	0.92	3.22	59 45	44.1
117	Oct. 24	+0.96	+3.30	17 7 9	—27 23 5.4
	27	0.93	3.42	7 9	5.3
118	1851.—Jan. 5	—2.14	+7.58	17 11 15	—17 35 35.2
	10	2.02	7.20	11 15	35.6
	15	1.81	6.80	11 15	36.0
119	1850.—Oct. 28	+0.94	+3.47	17 12 51	—27 50 49.5
	31	0.91	3.61	12 51	49.3
120	Oct. 26	+0.96	+3.48	17 13 23	—27 31 21.2
	30	0.92	3.64	13 23	21.0
121	Oct. 30	+0.93	+3.58	17 13 52	—27 48 59.1
	Nov. 1	0.91	3.66	13 52	59.0
122	1851.—Jan. 14	—1.93	+6.79	17 13 53	—17 33 2.1
	18	1.83	6.47	13 53	2.4
123	Jan. 17	—1.89	+6.32	17 21 16	—17 41 6.1
	19	1.83	6.16	21 16	6.3
124	Jan. 19	—1.85	+6.04	17 25 16	—17 43 26.6
	21	1.77	5.88	25 16	26.8
125	1850.—Nov. 1	+0.96	+4.14	17 28 46	—27 56 53.2
	3	0.94	4.03	28 46	53.4
	5	0.93	4.10	28 46	53.3
126	1851.—Jan. 22	—1.80	+5.63	17 31 59	—17 59 46.5
	26	1.96	5.36	31 59	46.7
127	Jan. 23	—1.81	+5.33	17 38 42	—18 2 38.1
	27	1.70	5.08	38 42	38.4
128	1850.—Nov. 5	+0.97	+4.37	17 43 53	—28 0 50.1
	9	0.94	4.52	43 53	50.0

No.	Date.	Reduction in α.	Reduction in δ.	Apparent α.	Apparent δ.
		s.	″	h. m. s.	° ′ ″
129	1851.—Jan. 26	—1.76	+4.92	17 46 21	—18 15 23.2
	29	1.68	4.74	46 21	23.4
130	1850.—Nov. 9	+0.95	+4.58	17 47 15	—28 2 0.8
	11	0.94	4.67	47 15	0.7
131	Nov. 9	+0.97	+4.72	17 52 25	—27 51 53.5
	12	0.95	4.82	52 25	53.4
132	Nov. 9	+0.97	+4.75	17 53 29	—27 49 5.8
	11	0.96	4.82	53 29	5.8
133	Nov. 12	+0.96	+4.89	17 55 55	—27 50 4.5
	14	0.95	4.94	55 55	4.5
134	Nov. 14	+0.95	+5.07	17 59 7	—27 39 20.4
	16	0.94	5.13	59 7	20.3
135	Nov. 13	+0.96	+5.02	17 59 51	—27 44 56.5
	15	0.95	5.09	59 51	56.5
136	Dec. 2	+0.92	+6.03	18 4 8	—25 10 47.1
	5	0.92	6.07	4 8	47.1
137	Nov. 15	+0.97	+5.20	18 4 47	—27 32 3.4
	18	0.95	5.31	4 47	3.3
138	Nov. 29	+0.92	+5.94	18 6 41	—25 44 59.6
	Dec. 1	0.92	5.98	6 41	59.5
139	Nov. 17	+0.96	+5.33	18 7 2	—27 27 14.2
	19	0.95	5.40	7 2	14.1
140	Nov. 20	+0.94	+5.52	18 8 41	—27 5 20.8
	22	0.94	5.57	8 41	20.7
141	1851.—Feb. 4	—1.63	+3.77	18 9 3	—18 50 44.9
	6	1.58	3.68	9 3	44.9
142	1850.—Nov. 28	+0.92	+5.94	18 9 31	—25 59 3.7
	30	0.93	5.97	9 31	3.6
143	Nov. 27	+0.93	+5.90	18 11 54	—26 8 36.9
	28	0.93	5.92	11 54	36.9
144	1851.—Feb. 5	—1.62	+3.62	18 12 35	—18 55 12.7
	8	1.54	3.50	12 35	12.8
145	1850.—Nov. 25	+0.94	+5.84	18 13 2	—26 28 43.0
	27	0.93	5.90	13 2	42.9
146	Nov. 24	+0.94	+5.85	18 15 20	—26 33 47.7
	26	0.94	5.89	15 20	47.6
147	Nov. 23	+0.95	+5.84	18 18 24	—26 42 54.7
	25	0.95	5.89	18 24	54.7
148	1851.—Feb. 9	—1.57	+3.12	18 23 41	—19 4 20.9
	11	1.51	3.05	23 41	20.9

A.—OBSERVATIONS OF VENUS I. WITH THE SANTIAGO EQUATORIAL.

The following changes have been made from the printed observations :

Page 222,	October	22.		Remarks.—All the observations from N°. 57, inclusive, are assumed to be recorded 1 rev. too great ; not the others too small, as printed.
223,	"	23,	N°. 34,	Micr. *for* 20*r*. 37 *read* 20*r*. 78.
228–9,	"	26,		The sign of $\Delta\delta$ should be negative.
233–4,	November	2,		" " " positive.
241,	"	13,	" 22,	Micr. *for* 4*r*. 15 *read* 4*r*. 45.
244–5,	"	15,		The names of the objects are transposed.
261–2,	January	14,		The sign of $\Delta\delta$ should be positive.
264,	"	16,	" 14,	$\Delta\delta$ *for* 0. 8½ *read* 0. 78½.
269,	"	24,		Remarks *for* corrected diameter 38″. 00 *read* 37″. 93

And for the results to be adopted and employed, the corrections and modifications are these :

Page 217,	October	19,	line	1,	*for*	12*r*. 004 = 3′ 53″. 96	*read*	12*r*. 140 = 3′ 56″. 61.
219,	"	20,	"	1,	"	6. 615	"	6. 614.
227,	"	25,	"	1,	"	8. 844 = 2′ 52″. 37	"	8. 846 = 2′ 52″. 41.
229,	"	26,	"	1,	The sign of $\Delta\delta$ should be negative.			
234,	November	2,	"	1,	" " " " positive.			
238,	"	8,	"	1,	*for*	11*r*. 683 = 3′ 47″. 72	*read*	11*r*. 689 = 3′ 47″. 82.
239,	"	10,	"	1,	"	2′ 25″. 29	"	2′ 25″. 30.
244,	"	14,	"	1,	"	6*r*. 238 = 2′ 1′. 58	"	6*r*. 246 = 2′ 1″. 75.
245,	"	15,	"	1, 2,	The names of the objects are transposed, and the signs of $\Delta\alpha$ and $\Delta\delta$ become positive.			
				2,	*for*	eleven,	*read*	twelve.
252,	"	26,	"	1,	"	4′ 26″. 03	"	4′ 25″. 03.
253,	"	29,	"	1,	"	4 40 . 14	"	4 45 . 14.
255,	December	3,	"	1,	"	2 42 . 10	"	2 41 . 73.
258,	January	10,	"	1,	"	6 12 . 60	"	6 11 . 60.
262,	"	14,	"	1,	The sign of $\Delta\delta$ should be positive.			
266,	"	17,	"	1,	*for*	2′ 34″. 20	*read*	2′ 34″. 24.
272,	"	28,	"	1,	"	5*r*. 045 = 1′ 38″. 33	"	4*r*. 992 = 1′ 37″. 28.
277,	February	6,	"	1,	"	5. 379 = 1 44 . 84	"	5 . 375 = 1 44 . 76.
280,	"	10,	"	1, 2,	The sign of $\Delta\delta$ should be positive.			
				1	*for*	1*r*. 834	*read*	1*r*. 835.
				2	"	13*h*. 46*m*. 19*s*.77	"	13*h*. 41*m*. 19*s*. 77.
				4	"	13 45 28 .11	"	13 40 28. 11.

We thus obtain our table of observations in the same form as the previous ones for *Mars*.

VENUS I.

Observations with the Santiago Equatorial.

Date.	Obs. part.	Sant. S.T.	Wash. M.T.	$t - T$.	Star N°.	Star's δ.	Meas'd $D\delta$.	Refr.	Obs'd δ.	N°. of comp. N. S.
		h. m. s.	h. m. s.	d.		° ′ ″	′ ″	″	° ′ ″	
1850.—Oct. 19	N.	22 25 50.70	8 7 22.03	—56.66155	110	—26 28 25.21	—3 56.61	0.22	—26 32 22.04	33
20	N.	22 11 55.14	7 49 32.85	55.67392	111	26 39 27.85	—2 8.93	.08	26 41 36.86	36
22	N.	22 21 4.80	7 50 49.19	53.67304	114	27 1 14.74	+2 32.53	.15	26 58 42.06	44
23	N.	22 19 41.90	7 45 30.61	52.67673	115	26 59 38.32	—6 47.09	.26	27 6 25.67	40
24	N.	22 6 7.53	7 28 2.55	51.68886	116	27 11 44.10	—1 46.81	.06	27 13 30.97	36
25	N.	22 36 59.11	7 54 53.17	50.67022	117	—27 23 5.40	+2 52.41	.02	—27 20 12.97	21
26	N.	22 16 46.07	7 30 47.53	49.68695	117	27 23 5.36	—3 8.72	.10	27 26 14.18	27
29	N.	21 55 30.16	6 57 47.39	46.70987	119	27 50 49.40	+9 46.65	.24	27 41 2.51	3
	N.	23 22 33.58	8 24 36.55	46.64958	119	27 50 49.40	+9 33.24	.80	27 41 15.36	4
30	N.	22 51 43.36	7 49 55.56	45.67366	119	27 50 49.35	+5 43.61	.23	27 45 5.51	5
31	N.	22 58 51.39	7 53 6.42	44.67145	121	—27 48 59.03	+ 28.73	.02	—27 48 30.28	9
Nov. 1	N.	22 41 8.48	7 31 30.50	43.68645	125	27 56 53.24	+5 33.40	.19	27 51 19.65	22
2	N.	22 59 11.28	7 45 34.44	42.67668	125	27 56 53.30	+3 12.29	.13	27 53 40.88	31
4	N.	22 33 37.34	7 12 12.87	40.69985	125	27 56 53.31	+ 4.76	.00	27 56 48.55	9
6	N.	22 58 11.79	7 28 51.48	38.68829	128	28 0 50.07	+2 54.94	.07	27 57 55.06	19
7	N.	22 59 47.05	7 26 30.57	37.68992	128	—28 0 50.03	+3 8.02	.11	—27 57 41.90	17
8	N.	22 59 3.94	7 21 51.67	36.69315	128	28 0 49.99	+3 47.82	.12	27 57 2.05	18
10	N.	22 28 27.40	6 43 28.32	34.71981	131	27 51 53.44	—2 25.29	.06	27 54 18.79	1
11	N.	23 24 2.89	7 34 58.80	33.68404	131	27 51 53.41	— 12.32	.01	27 52 5.74	29
13	N.	23 29 15.60	7 32 18.84	31.68589	133	27 50 4.50	+3 38.52	.15	27 46 25.83	24
14	N.	23 34 40.74	7 33 47.17	30.68487	135	—27 44 56.48	+2 1.75	.09	—27 42 54.64	27
15	N.	22 49 21.55	6 44 41.50	29.71896	134	27 39 20.34	+ 16.27	.01	27 39 4.06	3
	N.	23 35 11.06	7 30 21.51	29.68724	134	27 39 20.34	+ 25.26	.02	27 38 55.06	12
16	N.	23 30 58.43	7 22 13.65	28.69290	137	27 32 3.33	—2 27.03	.10	27 34 30.46	18
17	N.	23 13 10 49	7 0 32 73	27.70796	137	27 32 3.30	+2 24.05	.08	27 29 39.17	10
18	N.	23 42 16.68	7 25 38.23	26.69053	139	—27 27 14.11	+3 1.65	.15	—27 24 12.31	22
21	N.	23 28 8.62	6 59 44.76	23.70851	140	27 5 20.73	— 6.95	.00	27 5 27.69	22
24	N.	23 57 11.67	7 16 55.32	20.69658	147	26 42 54.67	+ 35.02	.03	26 42 19.62	2
25	N.	0 8 5.64	7 23 51.60	19.69176	146	26 33 47.63	+ 9.35	0.01	26 33 38.27	7
26	N.	0 49 46.83	8 1 30.04	18.66563	145	26 28 42.94	+4 25.03	1.35	26 24 16.56	3
28	N.	0 14 4.63	7 18 1.87	16.69581	143	—26 8 36.91	+3 42.95	0.37	—26 4 53.59	8
29	N.	0 29 46.56	7 29 45.32	15.68767	142	25 59 3.64	+4 45.14	.71	25 54 17.79	1
30	N.	0 25 42.47	7 21 45.99	14.69322	138	25 44 59.54	+1 46.05	.27	25 43 13.22	9
Dec. 3	S.	0 30 49.80	7 15 4.75	—11.69786	136	25 10 47.12	+2 41.73	.56	28 8 4.83	5
1851.—Jan. 6	S.	11 27 7.05	16 55 53.50	+22.70548	118	17 35 35 24	—3 3.93	.24	17 38 39.41	4
7	S.	11 31 6.03	16 55 55.91	23.70551	118	—17 35 35.32	+ 15.67	.02	—17 35 19.63	4
8	S.	11 37 27.35	15 58 20.27	24.66551	118	17 35 35.39	+2 55.14	.24	17 32 40.01	5
9	S.	11 37 11.14	15 54 8.20	25.66260	118	17 35 35.48	+4 52.97	.32	17 30 42.19	7
10	S.	11 34 1.83	15 47 3.49	26.65768	118	17 35 35.56	+6 11.60	.43	17 29 23.53	11
11	S.	11 16 42.64	15 25 51.23	27.64295	118	17 35 35.64	+6 54.10	.79	17 28 40.75	6
12	S.	11 42 8.19	15 47 16.70	28.65783	118	—17 35 35.72	+7 0.63	.44	—17 28 34.65	18
14	S.	11 57 19.97	15 54 34.17	30.66290	118	17 35 35.88	+5 33.36	.29	17 30 2.23	27
15	S.	11 55 21.72	15 48 40.34	31.65880	122	17 33 2.17	+1 37.80	.09	17 31 24.28	30
16	S.	11 56 53.91	15 46 16.36	32.65713	122	17 33 2.25	— 16.88	.01	17 33 19.14	22
17	S.	12 0 50.34	15 46 16.23	33.65713	122	17 33 2.33	—2 34.24	.15	17 35 36.72	14
18	S.	11 53 17.70	15 34 48.92	34.64918	123	—17 41 6.18	+2 54.50	.18	—17 38 11.50	10
20	S.	12 0 50.32	15 34 28.48	36.64894	124	17 43 26.72	—1 0.13	.06	17 44 26.91	18
24	S.	12 18 45.78	15 36 37.37	40.65043	127	18 2 38.18	+2 54.75	.14	17 59 43.29	8
26	S.	12 27 11.97	15 37 10.36	42.65081	127	18 2 38.30	—5 37.72	.26	18 8 16.28	15
27	S.	12 31 55.96	15 37 57.65	43.65136	129	18 15 23.24	+2 47.07	.13	18 12 35.04	8
28	S.	12 37 33.58	15 39 38.45	44.65253	129	—18 15 23.30	—1 37.28	.07	—18 17 0.65	13
Feb. 5	S.	13 7 24.77	15 37 57.48	52.65136	141	18 50 44.89	+ 48.67	.03	18 49 56.19	23
	N.	13 19 5.63	15 49 36.43	52.65945	141	18 50 44.89	+1 21.64	.05	18 49 23.20	17
6	N. S.	13 27 44.73	15 54 18.19	53.66271	144	18 55 12.69	+2 1.79	.06	18 53 10.84	25 25
7	N. S.	13 20 46.12	15 43 24.82	54.65515	144	18 55 12.73	—1 12.94	.04	18 56 25.71	12 12
10	N. S.	13 37 43.29	15 48 31.48	+57.65869	148	— 19 4 20.90	— 19.82	0.01	—19 4 40.73	12 12

B.—OBSERVATIONS OF VENUS I. WITH THE SANTIAGO MERIDIAN-CIRCLE.

After making the annexed correction in the printed observations,

			for	read
Page 322,	N°. 35,	Obs'd app. δ	—22° 58′ 7″. 79	—22° 59′ 7″. 79
	" 39,	Date,	December 20,	December 21.
	" 43,	Object,	N. L.	S. L.
	" 43,	Corr. for Semid.	+ 30″. 8	— 30″. 8
323,	" 4,	App. α	17h. 13m. 51s. 93	17h. 12m. 51s. 93
	" 4,	Obs'd transit,	17 13 59. 40	17 12 59. 40
	" 5,	Object,	N. L.	S. L.
	" 5,	Corr. for Semid.	+ 30″. 4	— 30″. 4
325,	" 24,	Obs'd app. δ	— 18° 4′ 56″. 79	— 18° 4′ 38″. 49

we have the series following:

VENUS I.

Observations with the Santiago Meridian-Circle.

Date.	Obs. part.	Santiago S.T.	Washington M.T.	Observed α.	Observed δ.	t—T.	Circle-reading.	Refr.	Nadir.
		h. m. s.	h. m. s.	h. m. s.	° ′ ″	d.	° ′ ″	″	″
1850.—Oct. 19	N.	16 39 31.25	2 21 59.32	16 39 31.25	— 26 30 16.65	—56.90140	353 3 53.68	— 6.34	— 2.92
20	N.	16 43 21.01	2 21 52.54	16 43 21.01	26 39 56.01	55.90148	353 13 25.30	6.20	5.18
21	N.	16 47 8.56	2 21 43.56	16 47 8.56	26 48 36.91	54.90158	353 22 23.55	6.06	6.47
22	N.	16 50 54.27	2 21 32.75	16 50 54.27	26 57 0.18	53.90171	353 30 46.85	5.99	6.57
23	N.	16 54 36.67	2 21 18.63	16 54 36.67	27 4 52.54	52.90187	353 38 39.00	5.83	6.52
24	N.	16 58 15.02	2 21 0.46	16 58 15.02	27 12 11.56	51.90208	353 45 54.17	5.75	2.75
25	N.	17 1 53.48	2 20 42.44	17 1 53.46	27 18 53.98	50.90229	353 52 36.75	5.58	3.08
26	N.	17 5 27.56	2 20 20.03	17 5 27.56	27 25 21.38	49.90255	353 59 3.42	5.48	2.45
27	N.	17 8 57.95	2 19 53.93	17 8 57.95	27 30 44.04	48.90285	354 4 28.22	5.47	4.60
28	N.	17 12 24.89	2 19 24.40	17 12 24.89	27 35 51.73	47.90319	354 9 35.68	5.42	4.42
30	N.	17 19 8.62	2 18 15.05	17 19 8.62	27 44 24.03	45.90399	354 18 8.00	5.26	4.60
31	N.	17 22 24.27	2 17 34.41	17 22 24.27	27 47 56.36	44.90446	354 21 40.90	5.11	5.32
Nov. 1	N.	17 25 35.56	2 16 49.27	17 25 35.56	27 50 57.61	43.90498	354 24 41.15	5.08	4.35
2	N.	17 28 42.34	2 15 59.64	17 28 42.34	27 53 20.45	42.90556	354 27 8.48	5.03	8.89
4	N.	17 34 41.81	2 14 6.31	17 34 41.81	27 57 23.25	40.90687	354 31 10.75	5.01	8.38
5	N.	17 37 33.47	2 13 1.76	17 37 33.47	27 57 36.57	39.90762	354 31 23.40	4.97	7.75
7	N.	17 43 0.84	2 10 36.26	17 43 0.84	27 58 0.16	37.90930	354 31 44.93	4.98	5.68
8	N.	17 45 35.51	2 9 14.59	17 45 35.51	27 57 26.52	36.91025	354 31 11.68	5.00	6.05
10	N.	17 50 25.31	2 6 11.78	17 50 25.31	27 54 49.85	34.91236	354 28 36.78	5.09	7.73
11	N.	17 52 40.15	2 4 30.35	17 52 40.15	27 52 50.56	33.91354	354 26 37.23	5.08	7.48
13	N.	17 56 47.85	2 0 45.55	17 56 47.85	27 47 19.97	31.91614	354 21 9.33	5.18	10.05
14	N.	17 58 40.22	1 58 41.70	17 58 40.22	27 43 56.15	30.91757	354 17 47.20	5.06	11.88
15	N.	18 0 24.55	1 56 29.84	18 0 24.55	27 40 7.95	29.91910	354 13 58.10	5.19	10.85
16	N.	18 2 0.22	1 54 9.34	18 2 0.22	27 35 45.83	28.92072	354 9 35.90	5.23	10.73
17	N.	18 3 27.29	1 51 40.27	18 3 27.29	27 30 55.13	27.92245	354 4 48.30	5.48	13.58
18	N.	18 4 45.42	1 49 2.27	18 4 45.42	27 25 36.55	26.92428	353 59 31.23	5.39	15.18
19	N.	18 5 54.46	1 46 15.21	18 5 54.46	27 19 58.79	25.92621	353 53 52.43	5.43	14.10
20	N.	18 6 53.87	1 43 18.55	18 6 53.87	27 13 47.94	24.92826	353 47 44.15	5.65	16.45
21	N.	18 7 43.45	1 40 12.08	18 7 43.45	27 7 11.85	23.93042	353 41 5.13	5.72	13.45
23	S.	18 8 52.38	1 33 29.01	18 8 52.38	26 53 22.88	21.93508	353 27 17.13	5.99	14.15
26	N.	18 9 17.96	1 21 6.78	18 9 17.96	26 27 5.68	18.94377	353 1 0.80	6.28	14.73
27	N.	18 9 5.15	1 17 58.10	18 9 5.15	26 17 38.52	17.94586	352 51 33.05	6.52	13.90
28	N.	18 8 40.99	1 13 38.09	18 8 40.99	26 7 46.14	16.94886	352 41 38.45	6.72	11.48
30	N.	18 6 21.70	1 3 27.37	18 6 21.70	25 46 25.73	14.95593	352 20 24.73	7.04	17.85
Dec. 2	N.	18 5 18.98	0 54 32.99	18 5 18.98	25 23 7.48	12.96212	351 57 6.48	7.36	17.53
4	N.	18 2 35.47	0 43 58.11	18 2 35.47	24 57 51.47	10.96947	351 31 51.50	7.77	18.15
5	N.	18 0 59.25	0 38 26.24	18 0 59.25	24 44 28.02	9.97331	351 18 28.25	7.94	18.18
8	N.	17 55 17.63	0 20 57.82	17 55 17.63	24 1 29.42	6.98544	350 35 20.88	8.57	8.78
10	N.	17 50 52.46	0 8 41.55	17 50 52.46	23 30 45.64	4.99396	350 4 36.78	9.02	8.02
(12)	N.	17 46 5.19	(11) 23 56 3.24	17 46 5.19	— 22 58 36.79	— 3.00274	349 32 30.13	— 9.44	— 9.83

Observations with the Santiago Meridian-Circle—Continued.

Date.	Obs. part.	Santiago S.T.	Washington M.T.	Observed α.	Observed δ.	$t-T$.	Circle-reading.	Refr.	Nadir.
		h. m. s.	h. m. s.	h. m. s.	° ′ ″	d.	° ′ ″	″	″
1850.—Oct.(13)	S.	17 43 35.16	(12) 23 49 37.70	17 43 35.16	— 22 43 9.85	— 2.00721	349 17 2.25	— 9.59	— 8.70
21	S.	17 21 22.54	22 52 5.52	17 21 22.54	20 14 37.15	+ 6.95558	346 48 36.73	12.27	13.20
22	S.	17 19 8.98	22 45 56.42	17	19 59 27.16	7.94857	346 33 27.22	12.40	13.55
29	S.	17 8 4.90	22 7 22.78	17 8 4.90	18 31 29.45	14.92179	345 5 20.53	13.87	3.10
31	S.	17 6 19.63	21 57 42.62	17 6 19.63	18 13 16.49	16.91508	344 47 8.75	14.20	3.95
1851.—Jan. 5	S.	17 4 53.11	21 36 40.12	17 4 53.11	17 41 51.79	21.90046	344 15 47.15	14.85	6.40
6	S.	17 5 5.71	21 32 56.78	17 5 5.71	17 37 56.73	22.89788	344 11 53.85	14.63	8.48
7	S.	17 5 27.64	21 29 22.74	17 5 27.64	17 34 46.03	23.89540	344 8 42.45	14.81	7.50
8	S.	17 5 58.98	21 25 58.08	17 5 58.98	17 32 16.93	24.89303	344 6 13.50	14.78	7.68
9	S.	17 6 39.46	21 22 42.54	17 6 39.46	17 30 29.83	25.89077	344 4 26.88	14.74	8.20
10	S.	17 7 28.90	21 19 35.94	17 7 28.90	17 29 19.80	26.88861	344 3 16.28	14.74	7.63
11	S.	17 8 27.17	21 16 38.13	17 8 27.17	17 28 48.40	27.88655	344 2 47.85	14.84	10.50
12	S.	17 9 33.99	21 13 48.85	17 9 33.99	17 28 46.54	28.88459	344 2 49.08	14.68	13.75
13	S.	17 10 49.18	21 11 7.93	17 10 49.18	17 29 21.51	29.88273	344 3 23.48	14.78	13.05
14	S.	17 12 12.28	21 8 34.90	17 12 12.28	17 30 25.68	30.88096	344 4 29.88	14.69	15.40
15	S.	17 13 43.34	21 6 9.80	17 13 43.34	17 31 57.25	31.87928	344 5 58.88	14.64	12.88
16	S.	17 15 21.82	21 3 52.10	17 15 21.82	17 33 55.61	32.87769	344 7 58.73	14.63	14.38
17	S.	17 17 7.73	21 1 41.89	17 17 7.73	17 36 16.86	33.87618	344 10 19.18	14.78	13.43
20	S.	17 23 7.59	20 55 52.95	17 23 7.59	17 45 18.41	36.87214	344 19 18.48	14.63	11.33
21	S.	17 25 20.84	20 54 9.93	17 25 20.84	17 48 53.62	37.87095	344 22 54.43	14.30	12.40
22	S.	17 27 40.15	20 52 32.95	17 27 40.15	17 52 41.51	38.86982	344 26 43.40	14.28	13.50
23	S.	17 30 5.62	20 51 2.11	17 30 5.62	17 56 36.81	39.86877	344 30 41.08	14.18	15.98
24	S.	17 32 36.84	20 49 37.01	17 32 36.84	18 0 44.42	40.86779	344 34 47.43	14.25	14.65
25	S.	17 35 13.73	20 48 17.56	17 35 13.73	18 4 56.79	41.86687	344 39 0.50	14.27	15.33
26	S.	17 37 55.96	20 47 3.44	17 37 55.96	18 9 18.20	42.86601	344 43 18.70	14.24	12.15
27	S.	17 40 43.29	20 45 54.40	17 40 43.29	18 13 38.97	43.86521	344 47 42.73	14.22	15.43
28	S.	17 43 35.68	20 44 50.41	17 43 35.68	18 18 3.38	44.86447	344 52 6.05	14.13	14.43
Feb. 3	S.	18 2 25.00	20 40 1.20	18 2 25.00	18 43 22.23	50.86112	345 17 20.78	13.74	—10.70
5	S.	18 9 13.90	20 38 57.16	18 9 13.90	18 50 48.16	52.86038	345 24 35.50	13.61	+ 0.38
6	S.	18 12 43.57	20 38 30.35	18 12 43.57	18 54 12.44	53.86007	345 28 1.45	13.42	— 1.48
7	S.	18 16 16.99	20 38 7.28	18 16 16.99	18 57 27.12	54.85981	345 31 17.00	13.42	2.35
10	S.	18 27 15.75	20 37 16.51	18 27 15.75	— 19 5 35.59	+57.85922	345 39 24.78	—13.40	— 1.68

C.—OBSERVATIONS OF VENUS I. WITH THE WASHINGTON EQUATORIAL.

The requisite corrections appear to be, for these observation, thus :

Page 391, October 22, No. 18, $\Delta\delta$ *for* 11*r*. 989 *read* 10. 989

392, " 28, The whole series of printed $\Delta\delta$ is evidently computed by the employment of the differences corresponding to the third and second threads, instead of the second and first; and it has been taken for granted that the observation was made in this way. Otherwise the $\Delta\delta$ must be increased by 3″. 0 and 3″. 11 respectively.

395, November 9, No. 3, $\Delta\delta$ *for* 21*r*. 736 *read* 21*r*. 734

397, " 13, " 15 " 11*r*. 140 " 11*r*. 144

399, " 21, The sign of $\Delta\delta$ should be negative.

400, January 13, No. 16, $\Delta\delta$ *for* 26*r*. 171 *read* 26*r*. 231

401, Micr. perhaps 46*r*. 391, which has been adopted.

402, " 15, No. 5–9, Some error in the time must exist here, probably in the minutes; as also between Nos. 33 and 41.

403, " 15, No. 76, Micr. *for* 2 59. 631 *read* 2 57. 631

404, " 24, The comparison-star is not in Taylor.

And for the deduced results we have—

Page 390,	October	21,	lines 1, 2,	*for* 6r. 132 = 1′ 34″. 26 *read* 6r. 198 = 1′ 35″. 26
Insert page 390,	"	21,		The comparisons in declination with the second star give—
				Venus S — ✱ (4 comparisons) = + 23r. 045 = 5′ 54″. 24, Δρ = 2.″49
				" N — ✱ (4 ") = + 24 . 775 = 6 20 . 83, Δρ = 2. 89
" 391,	"	22,	line 1,	Mean Chron'r time *for* 5h. 57m. 9s..72 *read* 5h. 56m. 48s. 55
			" 3,	Δδ " 2′ 17″. 26 " 2′ 17″ 22
			" 5, 7,	*for* 11r. 315 = 2′ 53″. 92 " 11r. 135 = 2′ 51″. 16
" 392,	"	28,	" 7,	" 5′ 24″. 25 " 5′ 24″. 35
" 395,	November	2,	" 1,	Mean Chron'r time 5h. 41m. 29s. 38 " 5h. 42m. 44s. 38
" 396,	"	9,	" 5, 7,	Δδ *for* 21r. 797 = 5′ 35″. 06 " 21r. 793 = 5″ 35″. 00
	"	10,	" 5,	" three " two
Insert page 396,	"	10,		The comparisons in declination with the second star give—
				Venus S — ✱ (2 comparisons) = — 14r. 231 = 3′ 38″. 74 Δρ = 1″. 32
				" N — ✱ (2 ") = — 11 . 367 = 2 54 . 73 Δρ = 1 . 05
" 398,	"	14,	" 1, 3,	Δδ *for* 1r. 948 = 27″. 94 *read* 1r. 815 = 27″. 90
" 399,	"	21,		The sign of Δδ should be negative.
" 404,	January	15,	" 7, 8,	Δδ *for* 6r. 879 = 1′45″.74 *read* 6r.900 = 1′46″.06
	"			The comparison-star is Argel .391. 70.

The observation of October 19 is excluded from the discussion.

VENUS I.

Observations with the Washington Equatorial.

Date.	Obs. part.	Wash. S.T.	Wash. M.T.	$t-T.$	Star N°.	Star's δ.	Meas'd $D\delta$.	Refr.	Obs'd δ.	N°. comp. N. S.
1850.		h. m. s.	h. m. s.			° ′ ″	′ ″	″	° ′ ″	
Oct. 19	N. S.	20 8 23.71	6 16 6.61	—56.738816	110	—26 28 25.21	—4 23.86	1.78	—26 32 50.85	4 3
21	N. S.	20 11 51.14	6 11 41.66	54.736182	112	26 52 17.85	+1 52.72	0.70	26 50 24.43	4 4
					113	56 32.32	+6 7.54	2.69	22.09	4 4
22	N. S.	20 1 25.02	5 57 23.35	53.751814	114	27 1 14.74	+2 34.19	0.46	26 58 40.09	5 4
28	N. S.	20 25 35.48	5 57 52.40	47.751478	120	27 31 21.08	—5 42.23	2.01	27 37 5.32	3 3
Nov. 1	N. S.	20 31 13.19	5 47 45.55	43.758501	125	27 56 53.24	+5 0.07	1.47	27 51 51.70	4 4
2	N. S.	20 30 26.21	5 43 2.80	42.761773	125	27 56 53.29	+2 38.23	0.70	27 54 14.36	8 8
9	N. S.	20 52 45.79	5 37 47.36	35.765424	130	28 2 0.83	+5 11.49	1.54	27 56 47.80	3 3
10	N. S.	20 58 58.72	5 40 3.36	34.763950	131	27 51 53.45	—3 16.74	1.18	27 55 11.37	2 2
	N. S.	20 36 45.51	5 17 53.79	34.779239	130	28 2 0.78	+6 47.88	1.88	27 55 11.02	2 3
13	N. S.	21 3 43.99	5 33 0.13	31.768748	133	27 50 4.50	+2 28.78	0.80	27 47 34.92	4 4
14	N. S.	20 59 54.68	5 25 15.53	30.774127	135	27 44 56.48	+ 50.52	0.24	27 44 5.72	4 4
21	N. S.	21 17 19.48	5 15 6.11	—23.781180	140	—27 5 20.73	—1 32.02	0.44	27 6 55.19	10 11
1851.										
Jan. 13	N. S.	14 12 19.71	18 38 56.76	+29.777047	118	17 35 35.80	+6 20.50	6.13	17 29 9.17	12 12
15	N. S.	13 54 26.81	18 13 14.98	31.759202	122	17 33 2.17	+1 21.56	0.14	17 31 40.47	16 16
24	N. S.	14 21 23.34	18 4 43.90	+40.753286	126	—17 59 46.61	— 27.22	0.05	—18 0 13.88	4 4

From the Greenwich volumes we obtain the meridian observations,

D.—OBSERVATIONS OF VENUS I. WITH THE GREENWICH MURAL CIRCLE.

VENUS I.

Observations with the Greenwich Mural Circle.

Date.	Obs. part.	Green. S.T.	Wash. M.T.	$t-T.$	Circle-reading.	Refr.	Zenith Pt. corr.	Observed δ.	Semid.
							83° 31′		
		h. m. s.	h. m. s.	d.	″	′ ″	″	° ′ ″	″
1850.—Oct. 15	S.	16 23 6.00	— 2 20 12.3	— 61.09736	51.95	4 9.91	26.52	— 25 44 43.06	15.11
16	C.	16 27 3.85	2 20 11.0	60.09770	25.13	4 11.94	26.52	25 56 33.38	
21	N.	16 46 25.15	2 20 32.4	55.09760	44.00	4 31.43	25.62	26 47 29.23	16.59
Nov. 11	N.	17 52 15.24	2 37 27.1	34.10934	39.30	4 55.26	24.28	27 53 58.00	24.88
28	N.	18 8 48.90	3 27 46.7	17.14429	52.23	4 24.80	23.03	26 10 45.90	29.07
29	N.	18 8 16.68	3 32 14.7	16.14739	37.60	4 22.16	23.03	26 0 28.96	29.38
Dec. 6	N.	17 59 37.56	— 4 8 23.8	— 9.17250	0.18	3 53.97	20.82	24 34 30.09	33.93
27	C.	17 10 44.24	17 36 20.9	+ 12.73358	38.12	2 46.44	20.73	18 55 26.65	
							+ 8′		
1851.—Jan. 8	N.	17 5 50.23	16 44 16.7	24.69742	50.30	2 32.83	37.95	17 32 47.17	24.30
17	N.	17 16 44.89	16 19 46.4	33.68040	55.52	2 34.18	39.05	17 35 52.32	21.00
22	N.	17 27 11 03	16 10 31.3	38.67397	58.73	2 38.70	38.90	17 51 59.34	19.20
29	N.	17 45 56.90	16 1 42.7	45.66786	42.83	2 37.03	38.51	18 21 37.90	17.30
Feb. 2	N.	17 58 26.66	15 58 26.8	49.66559	38.19	2 41.61	38.51	18 38 36.40	16.30
3	S.	18 1 44.91	15 57 48.6	50.66515	8.93	2 43.58	38.37	18 42 35.73	16.60
5	N.	18 8 32.14	15 56 42.9	52.66439	6.90	2 42.94	38.37	18 50 5.68	15.60
7	N.	18 15 33.65	15 55 51.4	54.66379	52.69	2 41.79	38.37	18 56 49.90	15.20
16	S.	18 49 40.82	15 54 29.8	+ 63.66284	39.59	2 52.30	38.13	— 19 13 19.14	13.50

To which are added finally the two observations at Altona, (A.N. XXXIII, 23.)

E.—OBSERVATIONS OF VENUS I. WITH THE ALTONA MERIDIAN-CIRCLE.

VENUS I.

Observations with the Altona Meridian-Circle.

CENTER.

Date.	Altona M.T.	Wash. M.T.	Obs'd α.	Obs'd δ.	$t—T.$
	h. m. s.	h. m. s.	h. m. s.	° ′ ″	
1851.—Jan. 27	21 12 3	15 24 6	17 40 4.08	—18 12 27.9	+43.641736
31	21 8 11	15 20 14	17 51 57.81	—18 29 52.6	+47.639051

IV. SECOND SERIES OF OBSERVATIONS OF VENUS.

Apparent places of stars compared with Venus during the second series of observations.

No.	Date.	Reduction in α.	Reduction in δ.	Apparent α.	Apparent δ.
		s.	″	h. m. s.	° ′ ″
36	1852.—Aug. 11	—0.22	+0.90	7 26 52	+15 15 2.3
	14	0.16	0.94	26 52	2.3
37	Aug. 15	—0.14	+0.92	7 29 28	+15 24 43.1
	17	0.10	0.93	29 28	43.1
38	July 30	—0.45	+0.74	7 29 29	+14 40 7.6
	Aug. 1	0.42	0.80	29 29	7.7
39	Aug. 7	—0.31	+0.89	7 30 38	+14 53 37.5
	9	0.27	0.90	30 38	37.5
40	Aug. 3	—0.38	+0.82	7 30 58	+14 47 39.9
	5	0.35	0.86	30 58	40.0
41	Aug. 20	—0.05	+0.88	7 32 44	+15 40 22.9
	22	0.00	0.89	32 44	22.9
42	July 29	—0.47	+0.70	7 33 42	—14 33 1.5
	31	0.44	0.76	33 42	1.6
43	Aug 21	—0.03	+0.85	7 33 50	+15 49 52.0
	24	+0.04	0.84	33 50	51.9
44	Aug. 24	+0.03	+0.35	7 38 58	+15 53 1.0
	28	0.12	0.27	38 58	0.9
45	May 29	—0.88	+1.04	7 41 51	+24 9 13.7
	31	0.89	1.03	41 51	13.7
46	Aug. 27	+0.07	+0.70	7 44 53	+15 58 41.1
	30	0.14	0.65	44 53	41.1
50	May 29	—0.85	+1.14	7 47 14	+24 0 39.0
	June 2	0.87	1.12	47 14	39.0
51	Aug. 27	+0.06	+0.62	7 48 35	+16 10 53.2
	30	0.13	0.57	48 35	53.2
53	June 1	—0.85	+1.12	7 50 52	+23 34 51.2
	3	0.86	1.12	50 52	51.2
56	Sept. 1	+0.15	—0.54	7 53 31	+15 58 1.9
	3	0.20	0.47	53 31	1.8

No.	Date.	Reduction in α.	Reduction in δ.	Apparent α.	Apparent δ.
		s.	″	h. m. s.	° ′ ″
59	1852.—June 3	—0.82	+1.13	7 59 14	+22 50 46.5
	7	0.83	1.15	59 14	46.6
61	Sept. 2	+0.13	+0.39	8 5 27	+16 4 21.1
	4	0.19	0.32	5 27	21.0
64	Jan. 18	+0.47	—4.02	8 11 44	+24 28 59.3
	28	0.57	3.83	11 45	59.5
	Feb. 7	0.61	3.42	11 45	59.9
	17	0.60	2.90	11 45	29 0.4
	27	0.55	2.27	11 45	1.0
	Mar. 8	0.45	1.61	11 44	1.7
	18	0.32	0.92	11 44	2.4
66	Feb. 2	+0.60	—3.65	8 13 11	+24 29 18.8
	4	0.61	3.57	11 11	18.9
68	Jan. 31	+0.59	—3.77	8 16 9	+24 25 1.6
	Feb. 3	0.61	3.66	16 9	1.7
70	June 9	—0.75	+1.32	8 19 28	+21 38 17.2
	13	0.76	1.32	19 28	17.2
74	June 11	—0.75	+1.31	8 21 43	+21 20 55.6
	13	0.75	1.33	21 43	55.6
75	July 8	—0.69	+0.68	8 24 24	+15 46 20.8
	10	0.70	0.71	24 24	20.9
76	July 5	—0.70	+0.70	8 26 58	+16 14 8.5
	7	0.69	0.74	26 58	8.5
81	June 14	—0.71	+1.35	8 31 10	+20 36 13.6
	16	0.72	1.36	31 10	13.6
83	June 22	—0.71	+1.05	8 32 24	+18 46 15.7
	24	0.72	1.07	32 24	15.7
84	June 21	—0.71	+1.09	8 32 35	+19 0 44.1
	23	0.72	1.12	32 35	44.1
86	June 23	—0.69	+1.16	8 39 24	+18 35 43.9
	25	0.69	1.18	39 24	43.9

A.—OBSERVATIONS OF VENUS II. WITH THE SANTIAGO EQUATORIAL.

The corrections to the observations are:

The sign of $\Delta\delta$ is to be reversed, except in the following cases:

Page 283, June 12
284, " 15
285, " 22
287, " 24
Page 288, July 6
289, " 9
294, " 13
299, " 28
Page 299, August 31
303, September 7

Page 282, No. 12, Object *for* P. *read* S. P.
291, *for* H. C. 14861 " W. VII. 905
Remarks. Corrected diameter *for* 56″. 53 *read* 56″. 33

And then for the deduced results:

The sign of $\Delta\delta$ is to be reversed, except in the following cases:

Page 284, June 12
295, August 16

Page 284, June 12, line 6, *for* s. *read* ″
287, " 23, " 1,2, " 3*r*. 102 = 1′0″. 46 *read* 3*r*. 118 = 1′ 0″. 77

We thus have the accompanying groups of observations:

VENUS II.

Observations with the Santiago Equatorial.

Date.	Obs. part.	Sant. S.T.	Wash. M.T.	$t - T$.	Star N°.	Star's δ.	Meas'd $D\delta$.	Refr.	Observed δ.	N°. of comp. N. S.
		h. m. s.	h. m. s.	d		° ′ ″	′ ″	″	° ′ ″	
1852.—May 30	N. S.	11 11 30.38	6 11 9.92	—45.742246	45	+24 9 13.74	—3 38.50	0.51	+24 5 34.73	5 5
June 2	N. S.	11 7 55.99	5 55 48.38	42.752913	53	23 34 51.22	—4 42.00	.56	23 30 8.66	7 7
3	N. S.	11 11 38.91	5 55 34.79	41.753070		23 15 2	+2 46.81	.33		2 2
12	N. S.	11 44 24.90	5 52 52.20	32.754952	74	21 20 55.62	—3 3.34	.37	21 17 51.91	4 4
15	N. S.	11 55 4.81	5 51 42.63	29.755757	81	20 36 13.59	— 23.59	.05	20 35 49.95	3 3
22	N. S.	12 21 2.00	5 50 4.18	22.756897	84	19 0 44.10	—2 20.57	.30	18 58 23.23	5 5
23	N. S.	12 32 36.03	5 57 40.40	21.751616	83	18 46 15.66	—1 26.64	.22	18 44 48.80	6 6
24	N. S.	12 32 34.05	5 53 42.52	20.754370	86	18 35 43.87	—4 14.98	.66	18 31 28.23	3 3
July 6	N.	13 7 23.71	5 41 15.53	8.763016	76	16 14 8.52	—1 42.91	.53	16 12 25.08	4
9	N.	13 11 12.51	5 33 15.97	— 5.768565	75	15 46 20.84	— 31.96	.27	15 45 48.61	10
30	N. S.	2 56 14.32	17 53 28.00	+15.745462	42	14 33 1.53	+3 33.12	.96	14 36 35.61	2 3
31	N. S.	3 0 38.37	17 53 55.42	16.745779	38	14 40 7.67	—1 56.67	.45	14 38 10.55	2 2
Aug. 4	N. S.	2 58 42.31	17 36 16.04	20.733518	40	14 47 39.94	— 34.33	0.10	14 47 5.51	1 3
8	N. S.	2 52 21.58	17 14 12.73	24.718202	39	14 53 37.69	+5 50.92	1.28	14 59 29.69	1 1
12	N. S.	3 17 33.80	17 23 37.18	28.724735	36	15 15 2.31	—1 19.88	0.16	15 13 42.27	5 4
13	N. S.	3 22 15.73	17 24 22.44	29.725259	36	15 15 2.32	+2 19.82	.27	15 17 22.41	3 3
16	N. S.	3 24 55.50	17 15 14.04	32.718912	37	15 24 43.12	+3 29.62	.40	15 28 13.14	4 4
21	N. S.	3 6 13.47	16 36 55.55	37.692311	41	15 40 22.88	+3 57.28	.85	15 44 21.01	3 4
	N. S.	3 38 5.09	17 8 41.94	37.714374	41	15 40 22.88	+4 1.88	.44	15 44 25.20	7 7
22	N. S.	3 31 51.35	16 58 33.32	38.707331	43	15 49 51.95	—2 41.89	.34	15 47 9.72	1 3
23	N. S.	3 46 20.19	17 9 53.87	39.714628	43	15 49 51.94	— 5.78	.01	15 49 46.15	3 2
28	N. S.	4 8 38.56	17 11 39.04	44.716423	46	15 58 45.08	+ 24.31	.03	15 59 5.42	3 4
Sept. 1	N. S.	4 15 41.69	17 2 57.39	48.710386	56	15 58 1.89	+3 2.50	.28	16 1 4.67	3 3
2	N. S.	4 11 1.23	16 54 21.80	49.704420	56	15 58 1.85	+2 39.65	.28	16 0 41.78	4 4
3	N. S.	4 16 2.64	16 55 26.47	50.705168	61	16 4 21.05	—4 27.58	.42	15 59 53.05	5 5
6	N. S.	4 21 54.04	16 49 29.19	53.701033	65	15 55 48.39	— 21.54	.03	15 55 26.82	5 5
7	N. S.	4 18 53.28	16 42 33.02	54.696216	65	15 55 48.52	—2 41.54	.30	15 53 6.68	4 4
8	N. S.	4 25 45.94	16 45 28.66	+55.698248	67	+15 44 33.78	+5 52.63	0.62	15 50 27.03	10 10

B.—OBSERVATIONS OF VENUS II. WITH THE SANTIAGO MERIDIAN CIRCLE.

A few corrections are here assumed.

Page 328,	N°. 31,	Observed transit	*for*	8*h.* 37*m.* 29*s.* 71	*read*	8*h.* 36*m.* 29*s.* 71
		App. α	"	8 36 31.93	"	8 35 31.93
329,	" 37,	The observed transit was probably		8 5 46.58		
	" 41,	Object	*for*	S. L	*read*	N. L.
		Corr. for Semid.	— 27″. 8		"	+ 27″. 8

After which we have the following table:

VENUS II.

Observations with the Santiago Meridian-Circle.

Date.	Obs. part.	Sant. S.T.	Wash. M.T.	Obs'd α.	Obs'd δ.	$t—T$.	Refr.	Nadir.
		h. m. s.	h. m. s.	° ′ ″	° ′ ″	d	′ ″	″
1852.—May 30	S.	7 42 40.12	2 42 53.87	302 27 35.1	+24 6 59.74	—45.886876	—1 21.93	+21.2
31	S.	7 45 54 91	2 42 12.22	302 39 10.4	23 55 27.82	44.887359	1 23.51	19.4
June 2	N.	7 52 10.03	2 40 34.49	303 2 21.8	23 32 12.34	42.888489	1 22.13	22.1
3	S.	7 55 10.33	2 39 38.40	303 15 10.3	23 19 21.69	41.889140	1 20.28	22.4
12	N.	8 18 12.13	2 27 13.22	305 14 32.9	21 20 12.09	32.897765	1 16.18	5.3
13	S.	8 20 15.90	2 25 20.73	305 29 4.0	21 5 38.98	31.899067	1 14.97	6.1
22	N.	8 33 24.53	2 3 4.00	307 33 35.0	19 0 57.79	22.914538	1 8.88	10.2
23	S.	8 34 12.56	1 59 55.99	307 47 45.9	18 46 45.90	21.916713	1 7.49	9.8
24	N.	8 34 51.54	1 56 38.96	308 0 29.0	18 34 6.34	20.918993	1 7.13	5.9
28	N.	8 35 56.65	1 42 0.23	308 51 51.4	17 42 43.24	16.929162	1 5.93	5.4
29	S.	8 35 49.10	1 37 56.80	309 4 50.1	17 29 48.13	15.931981	1 4.82	0.7
30	N.	8 35 31.93	1 33 43.76	309 16 0.2	17 18 37.26	14.934909	1 3.70	+ 0.3
July 1	N.	8 35 5.05	1 29 21.04	309 27 39.5	17 7 0.14	13.937951	1 3.73	— 1.8
5	N.	8 31 39.98	1 10 12.89	310 10 33.8	16 24 2.34	9.951240	1 4.53	+ 2.5
6	N.	8 30 24.47	1 5 1.67	310 20 18.3	16 14 14.01	8.954841	1 3.70	5.5
7	N.	8 28 59.90	0 59 41.44	310 29 40.8	16 4 52.83	7.958547	1 2.92	3.4
8	N.	8 27 26.39	0 54 12.26	310 38 24.2	15 55 52.84	6.962358	1 02.83	19.9
9	N.	8 25 43.98	0 48 34.21	310 46 52.7	15 47 21.81	5.966271	1 2.00	21.6
10	N.	8 23 52.28	0 42 46.90	310 54 56.3	15 39 24.11	4.970290	1 0.60	14.3
13	N.	8 17 36.67	0 24 44.58	311 16 16.9	15 18 2.06	— 1.982817	1 1.35	16.5
(18)	N.	8 3 17.53	(17)23 50 48.24	311 42 20.8	14 51 55.13	+ 2.993613	1 0.52	18.7
26	N.	7 42 24.78	22 54 35.71	311 59 48.3	14 34 26.30	11.954580	1 0.09	19.6
29	N.	7 36 3.24	22 36 27.49	311 58 10.7	14 36 5.93	14.941985	1 0.22	17.7
30	N.	7 34 11.60	22 30 40.24	311 56 53.3	14 37 19.73	15.937965	0 59.92	21.0
31	N.	7 32 27.97	22 25 0.98	311 55 13.1	14 39 2.22	16.934040	0 59.91	18.7
Aug. 4	N.	7 27 5.99	22 3 56.24	311 46 6.8	14 48 7.91	20.919400	1 0.40	19.8
5	N.	7 26 9.88	21 59 4.38	311 43 16.4	14 51 1.01	21.916023	1 0.20	16.9
6	N.	7 25 23.75	21 54 22.46	311 40 14.6	14 54 2.60	22.912761	1 0.09	17.0
7	N.	7 24 47.53	21 49 50.44	311 37 5.4	14 57 12.83	23.909611	0 59.82	15.7
8	N.	7 24 21.29	21 45 28.36	311 33 44.9	15 0 35.02	24.906579	0 59.71	13.9
10	N.	7 23 58.59	21 37 13.90	311 26 48.3	15 7 31.95	26.900855	1 1.24	15.1
12	N.	7 24 14.96	21 29 38.40	311 19 31.3	15 14 47.17	28.895583	1 2.06	17.7
13	N.	7 24 37.18	21 26 4.60	311 15 53.7	15 18 27.48	29.893109	1 1.07	14.0
14	N.	7 25 8.46	21 22 39.94	311 12 17.7	15 22 4.38	39.890740	1 0.37	12.4
16	N.	7 26 38.08	21 16 17.50	311 5 12.6	15 29 9.74	32.885313	1 1.03	12.8
21	N.	7 32 46.68	21 2 45.55	310 49 6.9	15 45 15.06	37.876917	1 3.75	15.9
22	N.	7 34 23.22	21 0 25.93	310 46 22.0	15 48 0.42	38.875300	1 2.61	14.3
23	N.	7 36 6.38	20 58 12.89	310 43 52.0	15 50 30.75	39 873760	1 3.04	14.4
28	N.	7 46 23.79	20 48 49.06	310 34 48.3	15 59 32.11	44.867234	1 3.00	16.7
31	N.	7 53 44.63	20 44 20.98	310 32 55.8	16 1 25.02	47.864132	1 4.11	17.4
Sept. 1	N.	7 56 22.31	20 43 2.33	310 32 58.9	16 1 20.70	48.863220	1 3.79	18.3
2	N.	7 59 4.68	20 41 46.35	310 33 23.8	16 0 58.28	49.862364	1 3.47	15.5
3	N.	8 1 51.78	20 40 39.08	310 34 13.7	16 0 9.87	50.861563	1 2.96	13.5
6	N.	8 10 39.66	20 37 37.80	310 38 57.6	15 55 23.86	53.859464	1 3.75	16.4
7	N.	8 13 43.85	20 36 45.58	310 41 21.2	15 52 59.95	54.858860	1 2.94	15.9
8	N.	8 16 51.87	20 35 57.19	310 44 9.8	+15 50 12.15	+55.858300	—1 2.34	+14.5

C.—OBSERVATIONS OF VENUS II. WITH THE WASHINGTON EQUATORIAL.

The corrections to the printed observations here assumed and applied are these:

Page 406,	May	31,	$\Delta\delta$	N°. 12,	*for*	32r. 108	*read*	32r. 098
407,	June	5,		" 7,	"	46 . 597	"	46 . 587
409,	"	9,		" 25,	"	0 . 847	"	0 . 841
410,	"	11,		" 2,	"	29 . 029	"	30 . 029
			Micr.	" 17,	"	4 26 . 181	"	4 46 . 181
411,	"	12,		" 6,	"	19 . 295	"	— 19 . 195
412,	"	26,	Micr. Nos.	8 & 10	"	3 & 4	"	2 & 3
414,	Aug.	29,		" 6,	"	43 . 216	"	42 . 856
	Sept.	5,		" 2,	"	42 . 656	"	+ 41 . 656

The results, therefore, become modified as follows:

Page 406, May 31,	line 1, 2,	*for*	32*r*. 057 = 8′ 12″. 74	*read*	32*r*. 055 = 8′ 12″. 75
408, June 5,	" 5,	"	7*h*. 58*m*. 6*s*. 60	"	8*h*. 22*m*. 6*s*. 60
410, " 11,	" 5,	"	9 16 7.80	"	9 14 57.70
	" 5, 7,	"	30*r*. 759 = 7′ 52″. 81	"	30*r*. 959 = 7′ 55″. 89
414, August 29,	" 5,	"	S. F.	"	N. F.
	" 5, 7,	"	42*r*. 749 = 10′ 57″. 10	"	42*r*. 660 = 10′ 55″. 76
	" 8,	"	+ 1″. 06	"	— 1″. 06

The observations of June 14, 15, 16, 27, and September 5, seem affected by some unknown source of error, and so non accordant with each other, or with the ephemeris, that the attempt to employ them has proved hopeless.

VENUS II.

Observations with the Washington Equatorial.

Date.	Obs. part.	Wash. S. T.	Wash. M. T.	$t—T$.	Star. N°.	Star's δ.	Meas'd $D\delta$	Refr.	Obs'd δ.	N°. comp. N. S.
1852.		h. m. s.	h. m. s.			° ′ ″	′ ″		° ′ ″	
May 31	N. S.	12 51 29.63	8 12 45.94	—44*d*.657803	50	+24 0 39.03	— 7 57.26	0.30	+23 52 41.47	7 8
June 5	N. S.	13 18 41.43	8 20 13.73	39.652620	59	22 50 46.54	— 0.80	0.01	22 50 45.73	5 5
9	N. S.	13 34 47.65	8 20 33.66	35.652388	63	21 57 4.19	+ 22.53	0.02	21 57 26.74	6 6
11	N. S.	14 38 42.43	9 15 51.10	— 33.613992	70	21 38 17.24	— 8 17.20	1.80	21 29 58.24	5 5
Aug. 26	N. S.	2 9 3.27	15 46 4.69	+ 42.656998	44	17 53 0.91	+ 4 7.28	0.37	17 57 8.56	4 4
29	N. S.	2 20 38.01	15 45 49.81	+ 45.658827	51	+16 10 53.18	—11 16.36	1.09	+15 59 35.73	4 4

We also have seventeen Greenwich determinations.

D.—OBSERVATIONS OF VENUS II WITH THE GREENWICH TRANSIT CIRCLE.

VENUS II.

Observations with the Greenwich Transit Circle.

Date.	Obs'd part.	Green. S. T.	Wash. M. T.	$t—T$.	Circle-reading	Refr.	Zenith pt.	Observed δ.	Semid.
							+ 8′		
		h. m. s.	h. m. s.	d.	″	″	″	° ′ ″	″
1852.—May 24	S.	7 21 2.03	— 1 56 38.1	— 52.08100	9.26	27.90	45.43	25 10 36.30	13.40
July 3	S.	8 33 53.39	3 21 14.9	12.13976	40.58	38.45	45.75	16 46 11.34	24.60
5	S.	8 31 55.55	3 31 4.2	10.14658	40.81	37.68	45.75	16 25 14.49	25.40
6	S.	8 30 41.94	3 36 13.5	9.15016	29.19	38.15	45.75	16 15 24.58	25.70
7	S.	8 29 19.23	3 41 31.9	8.15384	58.23	39.08	45.75	16 5 56.33	26.00
8	S.	8 27 47.30	3 46 59.5	7.15763	0.23	39.31	45.75	15 56 53.92	26.30
12	S.	8 20 15.96	4 10 13.3	3.17376	33.97	40.42	46.50	15 25 15.48	27.40
13	S.	8 18 5.12	4 16 19.7	— 2.17801	22.82	40.45	46.50	15 18 28.96	27.60
16	S.	8 10 56.61	— 4 35 14.8	+ 0.80886	42.99	40.37	46.50	15 1 5.55	28.20
22	N.	7 52 41.90	18 39 2.1	7.77711	44.64	41.88	45.39	14 37 15.38	28.54
Aug. 4	S.	7 27 16.54	17 22 34.1	20.72401	1.17	41.22	45.91	14 46 51.08	25.70
12	S.	7 24 10.03	16 48 0.8	28.70001	26.17	40.92	45.91	15 13 23.02	22.90
24	N.	7 37 33.92	16 14 11.6	40.67652	12.50	40.25	46.15	15 51 49.39	19.10
30	N.	7 50 41.79	16 3 40.9	40.66922	33.15	40.56	46.49	16 0 30.15	17.30
Sept. 1	N.	7 55 49.58	16 0 57.0	48.66733	10.74	40.77	46.49	16 0 53.37	16.80
2	N.	7 58 31.34	15 59 42.5	49.66646	30.46	40.54	46.49	16 0 32.73	16.50
13	N.	8 32 41.32	15 50 31.9	+60.66009	56.75	41.81	46.50	15 30 6.32	14.30

And lastly, a few at Cracow.

E.—OBSERVATIONS OF VENUS II WITH THE CRACOW MERIDIAN CIRCLE.

VENUS II.

Observations with the Cracow Meridian-Circle.

CENTER.

Date.	Cracow M. T.	Wash. M. T.	Obs'd α.	Obs'd δ.	$t—T$.
	h. m. s.	h. m. s.	h. m. s.	° ′ ″	d.
1852.—June 2	3 6 41.0	20 38 38.6	7 51 23.83	+23 34 39.68	—43.139831
3	3 5 46.3	20 37 43.9	7 54 25.48	23 22 27.26	42.140465
4	3 4 46.3	20 36 43.9	7 57 21.94	23 9 58.81	41.141159
5	3 3 42.0	20 35 39.6	8 0 13.98	22 57 17.77	40.141904
7	3 1 16.6	20 33 14.2	8 5 41.27	22 31 6.57	38.143586
8	2 59 55.2	20 31 52.8	8 8 16.23	22 17 46.46	37.144524
11	2 55 18.2	20 27 15.8	8 15 28.13	21 36 55.44	34.147734
12	2 53 33.2	20 25 30.8	8 17 39.51	21 23 3.94	33.148949
14	2 49 44.6	20 21 42.2	8 21 43.35	20 55 16.91	31.151596
17	2 43 10.0	20 15 7.6	8 26 57.27	20 13 0.68	28.156162
18	2 40 44.5	20 12 42.1	8 28 27.99	19 59 8.04	27.157847
23	2 26 36.9	19 58 34.5	8 34 0.84	18 50 9.39	22.167655
26	2 16 25.9	19 48 23.5	8 35 37.84	18 10 31.48	19.174728
27	2 12 44.2	19 44 41.8	8 35 52.07	17 57 35.11	—18.177293
Aug. 17	21 39 56.5	15 11 54.1	7 27 20.50	15 31 1.83	+33.633265
18	21 37 3.9	15 9 1.5	7 28 24.00	+15 34 32.56	+34.631268

These complete the collection of such determinations of the positions of *Mars* and *Venus* as have been found capable of employment for our purpose, extending from November 2, 1849, to Septmber 8, 1852.

§ 7. OBSERVATIONS COMPARED WITH EPHEMERIS.

The next step to be taken is the computation of the tabular places for the moment of observation, and the comparison of these with the declinations observed. The course of this computation and comparison may readily be followed by means of the appended tables, which contain all those values which strictly depend upon the ephemeris, or upon computation; the term "computed place" being considered as denoting the apparent place of that part of the planet which was actually observed (whether limb or center) deduced from the ephemeris for the point and moment of observation. The mean of a nearly equal number of determinations of the two limbs is, however, considered as an observation of the center, affected merely by the influence of defective illumination. This influence might, in fact, have been disregarded for *Mars* in every instance, although it has been brought into the computation as a matter of form. Consequently the tables of "Computation for observations" afford for each observation the tabular right-ascension, declination, parallax, semidiameter, and resulting declination of the part observed; and appended to these the residual error of the ephemeris, as indicated by the observations.

MARS I.

Computation for Santiago Equatorial Observations.

Date.	Wash. M. T. in dec. of day	Tab. α.	Tab. δ.	Parallax.		Semid.		Def. ill.	Obs'd part.	Comp. δ.	$\Delta\delta$.
				α.	δ.	α.	δ.				
		h m. s.	° ′ ″	s.	″	s.	″	″		° ′ ″	″
1849.—Dec. 10	.515529	5 55 57.47	+26 16 13.0	—0.05	+12.704	0.54	8.03		C.	+26 16 25.7	+18.2
11	.427736	54 22.20	18 8.4	+ .42	12.214	0.54	8.03		C.	18 20.6	20.8
	.464571	54 18.37	18 12.9	+ .22	12.550	0.54	8.03		C.	18 25.4	21.3
	.509299	54 13.72	18 17.7	— .03	12.712	0.54	8.03		C.	18 30.4	19.5
12	.411837	52 39.54	20 4.7	+ .48	11.899	0.54	8.03		C.	20 16.6	19.6
	.445221	52 36.04	20 8.4	+ .31	12.398	0.54	8.03		C.	20 20.8	16.7
13	.491435	50 46.06	22 1.9	+ .02	12.713	0.54	8.03		C.	22 14.6	19.0
14	.473089	49 2.37	23 39.3	+ .11	12.669	0.53	8.02		C.	23 52.0	18.6
15	.415880	47 22.53	25 3.7	+ .40	12.142	0.53	8.01		C.	25 15.8	18.5
	.489014	47 14.78	25 10.0	— .01	12.696	0.53	8.01		C.	25 22.7	17.4
16	.410701	45 37.12	26 24.2	+ .41	12.106	0.53	8.00		C.	26 36.3	18.3
17	.454176	43 46.76	27 38.4	+ .15	12.583	0.53	7 98		C.	27 51.0	18.3
18	.431221	42 3.88	28 38.5	+ .25	12.412	0.53	7.96		C.	28 50 9	18.7
20	.426719	38 35.96	30 13.3	+ .23	12.376	0.53	7.92		C.	30 25.7	19.2
	.516089	38 26.74	30 16.7	— .27	12.311	0.53	7.92		C.	30 29.0	17.4
21	.416486	36 54.37	30 46.9	+ .27	12.276	0.53	7.89		C.	30 59.2	19.9
22	.445462	35 10.13	31 12.6	+ .07	12.448	0.52	7.86		C.	31 25.1	18.8
23	.422466	33 32.66	31 28.8	+ .19	12.299	0.52	7.83		C.	31 41.1	18.9
24	.431593	31 53.73	31 37.2	+ .12	12.320	0.52	7.79		C.	31 49.5	18.4
25	.428879	30 17.91	31 37.8	+ .11	12.268	0.52	7.76		C.	31 50.1	18.1
26	.429688	28 43.84	31 30.8	+ .09	12.223	0.51	7.72		C.	31 43.0	17.8
27	.439454	27 11.21	31 16.6	+ .01	12.181	0.51	7.68		C.	31 28.8	17.3
30	.400840	22 54.27	29 57.9	+ .16	11.879	0.50	7.55		C.	30 9.8	15.5
31	.408113	21 32.35	29 20.0	+ .10	11.853	0.50	7.50	—0.01	C.	29 31.8	13.4
1850.—Jan. 1	.402747	20 14.38	28 37.9	+ .11	11.766	0.50	7.45	.01	C.	28 49.7	15.8
2	.405376	18 58.80	27 51.1	+ .07	11.709	0.49	7.39	.01	C.	28 2.8	15.1
4	.408426	16 37.38	26 6.5	+ .02	11.547	0.49	7.29	.01	C.	26 18.0	16.0
6	.365404	14 32.03	24 13.2	+ .20	11.217	0.48	7.18	.01	C.	24 24.4	16.2
	.433114	14 27.92	24 9.2	— .14	11.287	0.48	7.17	.01	C.	24 20.5	15.9
7	.396962	13 31.23	23 10.3	+ .02	11.271	0.47	7.12	.01	C.	23 21.6	16.4
8	.398542	12 35.78	22 7.6	.00	11.178	0.47	7.06	.01	C.	22 18.8	16.1
9	.391292	11 44.34	21 4.4	+ .02	11.082	0.47	7.00	.01	C.	21 15.5	16.0
10	.405308	10 55.46	19 59.2	— .07	10.967	0.46	6.94	.01	C.	20 10.2	13.9
11	.393909	10 11.41	18 55.2	— .03	10.865	0.46	6.88	.01	C.	19 6.1	13.7
12	.385899	9 30.81	17 51.2	.00	10.790	0.45	6.82	.01	C.	18 2.0	14.3
13	.376816	8 53.91	16 47.9	+ .03	10.688	0.45	6.76	.01	C.	16 58.6	14.7
14	.387213	8 19.91	15 44.3	— .02	10.584	0.45	6.69	.02	C.	15 54.9	14.7
15	.382530	7 50.14	14 42.4	— .03	10.486	0.44	6.63	.02	C.	14 53.9	16.0
	.436439	7 48.63	14 39.1	— .28	10.161	0.44	6.62	.02	C.	14 49.3	13.2
16	.381733	7 24.72	13 41.9	— .04	10.384	0.44	6.57	.02	C.	13 52.3	14.5
17	.380340	7 1.38	12 43.2	— .05	10.281	0.43	6.51	.02	C.	12 53.5	15.0
18	.380105	6 42.45	11 46.4	— .06	10.175	0.43	6.45	.02	C.	11 56.6	15.3
19	.359055	6 27.41	10 52.8	+ .02	10.089	0.43	6.38	.02	C.	11 2.9	9.5
20	.354745	6 15.64	10 0.5	+ .03	9.990	0.42	6.32	.02	C.	10 10.5	11.1
21	.367235	6 7.27	9 9.8	— .04	9.886	0.42	6.26	.02	C.	9 19.7	10.8
22	.369468	6 2.51	8 22.2	— .06	9.778	0.41	6.20	.02	C.	8 32.0	11.9
23	.351916	6 1.22	7 38.1	.00	9.697	0.41	6.14	.02	C.	7 47.8	12.4
	.407392	6 1.24	7 35.7	— .24	9.448	0.41	6.14	.02	C.	7 45.1	10.6
24	.373805	6 3.36	6 55.1	— .10	9.552	0.41	6.08	.02	C.	7 4.6	11.8
25	.364575	6 8.77	6 16.2	— .07	9.478	0.40	6.02	.02	C.	6 25.7	11.4
26	.365774	6 17.51	5 39.5	— .09	9.370	0.40	5.96	.02	C.	5 48.9	11.6
27	.348543	6 29.26	5 6.2	— .03	9.310	0.39	5.90	.02	C.	5 15.5	11.7
28	.362791	6 34.61	4 34.5	— .10	9.174	0.39	5.84	.02	C.	4 43.7	12.6
29	.349222	7 2 64	4 6.3	— .05	9.113	0.39	5.78	.02	C.	4 15.4	11.6
31	.351182	5 7 48.33	+26 3 16.9	—0.08	+ 8.913	0.38	5.66	—0.02	C.	+26 3 25.8	+11.9

MARS I.

Computation of observations with the Washington Equatorial.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax. α.	Parallax. δ.	Semid. α.	Semid. δ.	Obs'd part.	Comp'd δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	s.	″	s.	″		° ′ ″	″
1849.—Nov. 2	.604822	6 25 51.09	+24 21 1.5	+0.19	−3.16	0.44	6.59	C.	+24 20 58.3	+ 21.5
4	.554117	6 26 25.52	24 25 54.7	0.38	3.67	0.45	6.71	C.	24 25 51.0	19.4
	.601903	6 26 26.19	24 26 2.1	0.19	3.18	0.45	6.71	C.	24 25 58.9	19.4
6	.550784	6 26 46.81	24 31 10.6	0.38	3.68	0.45	6.81	C.	24 31 6.9	18.8
12	.549888	6 26 21.82	24 48 33.1	0.33	3.58	0.47	7.12	C.	24 48 29.6	21.4
	.610775	6 26 20.86	24 48 44.4	0.06	3.15	0.47	7.12	C.	24 48 41.2	21.4
13	.516646	6 26 4.80	24 51 33.6	0.46	3.96	0.48	7.17	C.	24 51 29.6	22.9
24	.507357	6 18 39.10	25 28 20.3	0.38	3.75	0.51	7.67	C.	25 28 16.6	20.8
26	.509567	6 16 29.66	25 35 11.5	0.34	3.66	0.52	7.74	C.	25 35 7.9	29.8
	.597951	6 16 23.62	25 35 29.6	0.10	3.26	0.52	7.74	C.	25 35 26.3	18.4
Dec. 6	.506337	6 2 36.75	26 6 25.4	0.18	3.32	0 53	7.99	C.	26 6 22.1	23.8
	.491834	6 2 38.11	26 6 23.0	0.18	3.44	0.53	7.99	C.	26 6 19.6	21.1
11	.435642	5 54 51.37	26 18 9.4	0.44	3.90	0 54	8.03	C.	26 18 5.5	17.3
12	.461928	5 52 34.30	26 20 10.3	0.29	3.47	0.54	8.03	C.	26 20 6.8	22.1
17	.445164	5 43 47.72	26 27 37.8	0.28	3.39	0.53	7.98	C.	26 27 34.4	18.4
27	.397642	5 27 15.00	26 31 17.3	0.31	3.34	0.51	7.68	C.	26 31 14.0	18.2
31	.395237	5 21 33.38	26 29 20.6	0.24	3.14	0.50	7.50	C.	26 29 17.5	17.3
1850.—Jan. 5	.383281	5 15 33.31	26 25 11.3	0.21	2.99	0.48	7.23	C.	26 25 8.3	15.6
9	.361203	5 11 45.84	26 21 6.3	0.24	2.98	0.47	7.00	C.	26 21 3.3	11.9
12	.341853	5 9 32.53	26 17 54.1	0.27	3.01	0.45	6.82	C.	26 17 51.1	15.3
14	.370271	5 8 20.45	26 15 45.2	0.12	2.71	0.45	6.69	C.	26 15 42.5	14.6
22	.338453	5 6 2.61	26 8 23.6	0.14	2.57	0.41	6.20	C.	26 8 21.0	13.7
29	.275307	5 7 1.18	+26 4 8.3	+0.28	−2.73	0.39	5.78	C.	+26 4 5.6	+ 13.6

MARS I.

Computation of observations with the Greenwich Equatorial.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax. α.	Parallax. δ.	Semid. α.	Semid. δ.	Obs'd part.	Comp'd δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	s.	″	s.	″		° ′ ″	″
1849.—Nov. 26	.123480	6 16 55.70	+25 33 52.6		−9.77	0.51	7.72	C.	+25 33 42.9	+16″.1
30	.342963	6 11 44.33	25 47 58.0		6.21	0.52	7.86	C.	25 47 51.8	(27.3)
Dec. 8	.184993	5 59 52.27	26 10 46.6	+0.51	7.62	0.53	8.01	C.	26 10 39.0	
15	.272244	5 47 37.75	26 24 51.4	0.09	6.22	0.53	8.01	C.	26 24 45.2	17.4
27	.054511	5 27 46.24	26 31 22.8	0.61	8.45	0.51	7.70	C.	26 31 14.3	15.8
1850.—Jan. 4	.177475	5 16 53.02	26 26 19.6	0.16	5.74	0.49	7.30	C.	26 26 13.9	13.2
5	.107174	5 15 51.10	26 25 27.2	0.39	6.40	0.48	7.24	C.	26 25 20.8	13.9
7	.130159	5 13 46.60	+26 23 26.7	+0.35	−5.92	0.48	7.13	C.	+26 23 20.8	+ 13.1

MARS I.

Computation for Greenwich Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular α.	Tabular δ.	Parallax in δ.	Semid. α.	Semid. δ.	Comp. δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	″	s.	″	° ′ ″	″
1849.—Nov. 1	.438909	6 25 24.24	+24 18 13.0	−5.45	0.44	6.55	+24 18 7.55	+14.0
6	.426201	26 45.90	24 30 50 4	5.62	0.45	6.80	24 30 44.78	18.0
16	.397591	24 52.91	25 0 48.6	5.93	0.49	7.31	25 0 42.67	19.0
30	.350261	11 43.74	25 47 59.3	6.21	0.52	7.86	25 47 53.09	19.9
Dec. 4	.335377	6 6 0.55	26 0 18.9	6.24	0.53	7.96	26 0 12.66	18.9
8	.320051	5 59 38.94	26 11 16.7	6.24	0.53	8.01	26 11 10.46	18.3
15	.292590	47 35.59	26 24 53.2	6.18	0.53	8.01	26 24 47.02	19.8
17	.284694	44 4.67	26 27 27.1	6.15	0.53	7.98	26 27 20.95	18.9
19	.276816	40 35.34	26 29 23.2	6.11	0.53	7.94	26 29 17.09	18.5
27	.245890	27 28.78	26 31 19.9	5.91	0.51	7.69	26 31 13.99	15.1
28	.242129	25 59.32	26 31 0.5	5.87	0.51	7.65	26 30 54.63	16.6
29	.238397	24 32.37	26 30 35.0	5.84	0.51	7.61	26 30 29.16	16.1
1850.—Jan. 4	.216678	16 50.35	26 26 17.1	5.62	0.49	7.30	26 26 11.48	16.2
5	.213183	15 44.27	26 25 21.0	5.59	0.48	7.24	26 25 15.41	15.5
7	.206315	13 42.19	26 23 22.0	5.50	0.48	7.13	26 23 16.50	15.6
23	.157303	6 1.22	26 7 46.6	4.80	0.41	6.15	26 7 41.80	13.6
30	.139089	7 19.22	26 3 45.6	4.48	0.38	5.73	26 3 41.12	11.4
Feb. 6	.122584	11 5.19	26 1 47.3	4.18	0.36	5.35	26 1 43.12	9.8
7	.120352	11 48.52	26 1 38.7	4.14	0.35	5.30	26 1 34.56	9.4
9	.115982	13 23.00	26 1 26.7	4.06	0.35	5.19	26 1 22.64	8.9
13	.107584	17 1.76	26 1 18.7	3.90	0.33	4.99	26 1 14.80	8.9
16	.101565	20 10.29	26 1 22.1	3.79	0.32	4.85	26 1 18.31	8.2
21	.092035	26 6.98	26 1 32.0	3.61	0.31	4.63	26 1 28.39	8.9
22	.090193	−5 27 24.22	+26 1 32.9	−3.58	0.31	4.58	+ 26 1 29.32	+9.0

MARS I.

Computation of the Cape Equatorial Observations.

Date.		Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax in δ.	Semid. α.	Semid. δ.	Comp'd δ.	$\Delta\delta$.
			h. m. s.	° ′ ″	″	s.	″	° ′ ″	″
1849.—Nov.	21	.307022	6 21 36.23	+25 17 20.0	+ 11.80	0.50	7.53	+ 25 17 31.8	+ 18.2
		.307022	21 36.23	17 20.0	11.80	0.50	7.53	17 31.8	20.0
	22	.363335	20 41.89	20 57.7	11.81	0.50	7.57	21 9.5	19.2
	26	.329572	18 49.89	27 43.6	12.07	0.51	7.66	27 55.7	19.9
	25	.317405	17 48.46	31 7.2	12.15	0.51	7.69	31 19.4	20.0
		.317405	17 48.46	31 7.2	12.15	0.51	7.69	31 19.4	19.9
	26	.339021	16 41.23	34 36.8	12.15	0.52	7.73	34 48.9	18.6
	27	.302096	15 34.59	37 52.8	12.27	0.52	7.77	38 5.1	20.7
	28	.297948	14 25.96	41 13.6	12.33	0.52	7.80	41 26.0	20.1
	29	.332101	13 4.11	44 39.6	12.25	0.52	7.83	44 51.8	18.8
	30	.268942	11 41.81	47 43.4	12.35	0.52	7.86	47 55.7	18.5
Dec.	1	.290225	10 26.76	51 0.2	12.49	0.53	7.89	51 12.7	19.8
	2	.344352	8 57.43	54 18.7	12.26	0.53	7.92	54 31.0	18.7
	3	.285150	7 35.13	25 57 11.5	12.58	0.53	7.94	25 57 24.1	21.2
	4	.281160	6 5.50	26 0 9.4	12.62	0.53	7.96	26 0 22.0	20.1
	5	.271798	4 33.94	3 0.6	12.65	0.53	7.98	3 13.2	20.4
	6	.281303	2 58.33	5 48.8	12.69	0.53	7.99	6 1.5	20.5
	7	.263713	6 1 23.22	8 25.7	12.71	0.53	8.00	8 38.5	18.8
	8	.278387	5 59 43.08	11 0.5	12.73	0.53	8.02	11 13.2	20.0
	9	.283523	58 2.17	13 25.9	12.72	0.53	8.02	13 38.6	19.3
		.281321	58 2.39	13 25.6	12.73	0.53	8.02	13 38.3	19.4
	10	.327447	56 15.79	15 48.3	12.30	0.54	8.03	16 0.6	18.6
	11	.277968	54 37.74	17 49.9	12.73	0.54	8.03	18 2.6	19 4
	14	.247448	49 26.24	23 17.5	12.77	0.53	8.02	23 30.3	17.9
	15	.230645	47 42.16	24 47.7	12.75	0.53	8.01	25 0.4	17.9
	16	.225483	45 56.74	26 9.9	12.73	0.53	8.00	26 22.6	16.1
		.258560	45 53.23	26 12.5	12.70	0.53	8.00	26 25.2	17.5
	17	.262608	44 7.00	27 25.6	12.63	0.53	7.98	27 38.2	17.9
	18	.250296	42 22.89	28 28.1	12.65	0.53	7.96	28 40.8	17.6
	20	.228819	39 56.40	30 5.5	12.62	0.53	7.92	30 18.7	19.0
	21	.257289	37 10.62	30 42.0	12.42	0.53	7.89	30 54.4	18.8
	22	.241252	35 30.69	31 8.2	12.46	0.52	7.86	31 20.7	18.3
	23	.207219	33 53.99	31 25.9	12.49	0.52	7.83	31 38.4	17.7
	24	.247786	32 11.60	31 36.3	12.24	0.52	7.80	31 48.5	17.9
	25	.186950	30 40.97	31 38.3	12.36	0.52	7.76	31 50.7	18.2
		.207914	30 38.97	31 38.3	12.38	0.52	7.76	31 50.7	18.7
	26	.169406	29 8.09	31 33.3	12.23	0.52	7.73	31 45.5	18.5
		.202037	29 5.04	31 33.0	12.32	0.52	7.73	31 45.3	17.3
	29	.189040	24 36.62	30 36.3	12.12	0.51	7.61	30 48.5	18.2
1850.—Jan.	7	.176624	13 43.91	23 23.9	11.31	0.48	7.13	23 35.2	16.4
	8	.183802	12 47.37	22 21.2	11.16	0.47	7.07	22 32.4	15.6
	9	.149211	11 56.55	21 19.9	11.16	0.47	7.01	21 31.1	17.1
	10	.150057	11 7.41	20 15.6	11.06	0.46	6.95	20 26.7	15.0
	11	.159838	10 21.51	19 10.4	10.93	0.46	6.89	19 21.3	15.2
	12	.163640	9 39.59	18 5.5	10.81	0.46	6.83	18 16.3	15.4
	14	.149782	8 27.48	15 59.1	10.64	0.45	6.71	16 9.7	14.9
	15	130468	7 57.34	14 57.9	10.57	0.44	6.64	15 8.5	15.5
	16	.150427	7 29.66	13 55.7	10.43	0.44	6.58	14 6.4	14.6
	17	.127705	5 7 6.73	+26 12 57.8	+ 10.37	0.43	6.52	+ 26 13 8.2	+ 13.9

MARS I.

Computation for Cape Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular.		Parallax	Semid	Def. ill.		Computed.		$\Delta\,\alpha$.	$\Delta\,\delta$.
		α.	δ.	in δ	in δ.	α.	δ.	α.	δ.		
		h. m. s.	° ′ ″	″	″	s.	″	h. m. s.	° ′ ″	s.	″
1849.—Nov. 18	.340171	6 23 46.16	+25 7 15.4	+11.63	7.40	0.05	0.00	6 23 46.13	+25 7 27.03	—1.91	+19.03
19	.336981	23 6.25	10 37.1	11.71	7.44	0.05	0.00	23 6.23	10 48.81	1.91	18.59
21	.330466	21 35.07	17 24.8	11.86	7.53	0.04	0.00	21 35.05	17 36.66	1.79	19.53
22	.327144	20 44.06	20 50.1	11.94	7.57	0.04	0.00	20 44.04	21 2.04		15.28
24	.320367	18 50.50	27 41.8	12.08	7.65	0.03	0.00	18 50.48	27 53.88	(1.03)	(37.03)
25	.316927	17 48.47	31 7.2	12.15	7.69	0.03	0.00	17 48.45	31 19.35		24.08
27	.309915	15 34.03	37 54.5	12.27	7.77	0.03	0.00	15 34.02	38 6.77	1.69	19.15
28	.306351	14 21.80	41 15.4	12.33	7.80	0.02	0.00	14 21.79	41 27.73	1.69	19.31
29	.302750	13 6.37	44 33.8	12.39	7.83	0.02	0.00	13 6.36	44 46.19		18.68
30	.299113	11 47.84	47 49.3	12.45	7.86	0.02	0.00	11 47.83	48 1.75	1.63	21.62
Dec. 1	.295442	10 26.32	51 1.3	12.50	7.89	0.02	0.00	10 26.31	51 13.80		21.27
2	.291741	9 1.96	54 9.0	12.54	7.91	0.02	0.00	9 1.95	54 21.54	1.96	18.81
3	.288006	7 34.87	25 57 12.1	12.59	7.94	0.02	0.00	7 34.86	25 57 24.69		19.89
4	.284242	6 5.21	26 0 9.9	12.62	7.96	0.01	0.00	6 5.20	26 0 22.52		17.84
6	.276629	2 58.77	5 48.0	12.69	7.99	0.01	0.00	2 58.76	6 0.69		19.73
7	.272786	6 1 22.33	8 27.2	12.72	8.00	0.01	0.00	6 1 22.32	8 39.92		18.39
8	.268921	5 59 44.03	10 59.1	12.74	8.01	0.01	0.00	5 59 44.03	11 11.84		18.76
9	.265037	58 4.05	13 23.5	12.76	8.02	0.01	0.00	58 4.05	13 36.26		17.52
10	.261138	56 22.60	15 39.6	12.77	8.03	0.01	0.00	56 22.60	15 52.37	2.45	20.67
11	.257218	54 39.89	17 47.5	12.78	8.03	0.00	0.00	54 39.89	18 0.28	2.11	20.20
12	.253292	52 56.13	19 46.4	12.78	8.03	0.00	0.00	52 56.13	19 59.18	2.23	20.40
14	.245410	49 26 46	23 17.3	12.77	8.02	0.00	0.00	49 26.46	23 30.07	2 28	18.32
15	.241461	47 41.01	24 48.8	12.76	8.01	0.00	0.00	47 41.01	25 1.56	2.13	15.94
16	.237513	45 55.47	26 11.0	12.74	8.00	0.00	0.00	45 55.47	26 23.74	2.13	17.31
17	.233566	44 10.07	27 23.7	12.72	7.99	0.00	0.00	44 10.07	27 36.42	2.16	12.86
18	.229622	42 25.05	28 26.9	12.69	7.97	0.00	0 00	42 25.05	28 39.59	2.11	16.95
20	.221761	38 57.15	30 5.2	12.63	7.92	0.00	0.00	38 57.15	30 17.83	2.07	17.54
21	.217849	37 14.66	30 40.9	12.59	7.89	0.00	0.00	37 14.66	30 53.49	2.14	17.03
22	.213950	35 33.45	31 7.7	12.54	7.86	0.00	0.00	35 33.45	31 20.24		17.11
23	.210066	33 53.71	31 26.0	12.49	7.83	0.00	0.00	33 53.71	31 38.49	1.88	17.93
24	.206203	32 15.65	31 36.1	12.44	7.80	0.00	0.00	32 15.65	31 48.54	1.99	19.25
26	.198547	29 5.36	31 33.1	12.32	7.73	0.01	0.00	29 5.36	31 45.42	1.85	18.25
27	.194754	27 33.44	31 20.8	12.26	7.69	0.01	0.00	27 33.44	33 33.06	1.72	17.11
29	.187256	24 36.78	30 36.5	12.12	7.61	0.01	0.00	24 36.79	30 48.62	1.94	17.20
31	.179190	21 50.67	29 29.0	11.96	7.51	0.01	0.00	21 50.68	29 40.96	2.37	17.26
1850.—Jan. 3	.169063	18 3.37	27 12.8	11.71	7.35	0.02	0.00	18 3.38	27 24.51	1.89	14.03
4	.165529	16 53.84	26 19.9	11.63	7.30	0.02	0.00	16 53.85	26 31.53	1.81	13.46
7	.155159	13 45.16	23 25.2	11.35	7.13	0.02	0.00	13 45.17	23 36.55	1.80	17.30
8	.151781	12 49.11	22 23.1	11.26	7.07	0.02	0.00	12 49.12	22 34.36	1.74	16.13
9	.148444	11 56.60	21 19.9	11.16	7.01	0.03	0.00	11 56.61	21 31.06	1.72	11.97
10	.145148	11 7.65	20 15.9	11.06	6.95	0.03	0.00	11 7.66	20 26.96	1.65	12.55
11	.141893	10 22.30	19 11.5	10.97	6.89	0.03	0.00	10 22.31	19 22.47	1.60	14.23
12	.138681	9 40.59	18 7.2	10.87	6.83	0.03	0.00	9 40.60	18 18.07	1.62	13.10
14	.132383	8 28 13	16 0.1	10.67	6.71	0.03	0.00	8 28.15	16 10.77	1.56	12.80
15	.129291	7 57.38	14 58.1	10.57	6.64	0.03	0.00	7 57.40	15 8.67	0.95	12.68
16	.126255	7 30.29	13 57.3	10.47	6.58	0.04	0.00	7 30.31	14 7.77	—1.60	12.96
17	.123254	5 7 6.83	+26 12 58.1	+10.37	6.52	0.04	0.00	5 7 6.85	+26 13 10.47		+13.25

MARS I.

Computation of observations with the Cambridge Equatorial.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax in δ.	Semid. α.	Semid. δ.	Obs. part.	Comp'd δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	″	s.	″		° ′ ″	″
1849.—Nov. 14	.612020	6 25 41.34	+24 55 1.7	—3.95	0.48	7.22	C.	+24 54 57.7	+19.8
15	.739502	6 25 12.21	24 58 39.7	5.51	0.49	7.28	N.	24 58 41.5	17.5
	.748294	6 25 11.96	24 58 41.4	5.70	0.49	7.28	S.	24 58 28.5	20.6
16	.439826	6 24 51.62	25 0 56.9	5.83	0.49	7.31	C.	25 0 51.1	19.1
	.765942	6 24 41.40	25 2 1.2	6.19	0.49	7.33	S.	25 1 47.7	19.2
21	.453766	6 21 28.92	25 17 50.2	5.31	0.50	7.54	C.	25 17 44.9	19.8
	.741577	6 21 9.86	25 18 49.4	6.11	0.50	7.55	C.	25 18 43.3	20.5
26	.756899	6 16 12.70	25 36 2.0	7.10	0.52	7.75	S.	25 35 47.1	20.5
30	.743146	6 11 11.88	25 49 15.3	7.02	0.52	7.87	C.	25 49 8.3	19.6
Dec. 6	.765770	6 2 11.69	26 7 7.1	8.62	0.53	8.00	C.	26 6 58.5	
11	.297944	5 54 35.66	26 17 52.4	7.61	0.54	8.03	C.	26 17 44.8	18.8
12	.339519	5 52 47.11	26 19 56.4	6.34	0.54	8.03	N.	26 19 58.1	
17	.333503	5 43 59.51	26 27 30.4	5.93	0.53	7.98	N.	26 27 32.4	18.1
18	.368690	5 42 10.44	26 28 34.9	5.05	0.53	7.96	S.	26 28 21.9	
21	.340698	5 37 2.10	26 30 44.6	5.33	0.53	7.89	S.	26 30 31.4	
27	.329415	5 27 21.19	26 31 18.5	5.06	0.51	7.69	N.	26 31 21.1	16.9
Dec. 28	.285425	5 25 55.29	26 30 59.5	5.80	0.51	7.65	S.	26 30 46.0	12.4
	.345703	5 25 50.16	26 30 58.1	4.57	0.51	7.65	C.	26 30 53.5	14.4
29	.721218	5 23 51.18	26 30 20.4	9.42	0.51	7.58	N.	26 30 18.6	(10.0)
31	.457302	5 21 28.42	26 29 18.1	3.80	0.50	7.50	S.	26 29 6.8	16.2
1850.—Jan. 1	.281197	5 20 23.71	26 28 43.7	5.44	0.50	7.45	S.	26 28 30.8	18.0
4	.268358	5 16 46.85	26 26 14.2	5.36	0.49	7.29	N.	26 26 16.1	15.2
5	.388580	5 15 32.97	26 25 11.0	3.65	0.48	7.23	C.	26 25 7.3	+15.8
6	.254967	5 14 38.75	26 24 19.9	5.42	0.48	7.18	S.	26 24 7.3	
10	.279322	5 11 1.33	+26 20 7.3	—4.57	0.46	6.94	S.	+26 19 55.8	

MARS I.

Computation for Athens Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular δ.	Parallax.	Semid.	Def. ill.	Comp. δ.	Δ δ.
		° ′ ″	″	″	″	° ′ ″	″
1849.—Nov. 22	.312581	+25 20 47.2	+3.04	7.57	0.00	+25 20 42.7	+28.1
23	.309213	25 24 12.9	3.04	7.61	0.00	25 24 23.5	23.3
25	.302362	25 31 4.2	3.05	7.65	0.00	25 31 14.9	23.9
26	.298877	25 34 28.5	3.05	7.69	0.00	25 34 23.9	28.2
28	.291794	25 41 12.4	3.05	7.77	0.00	25 41 7.7	28.5
29	.288183	25 44 30.9	3.05	7.80	0.00	25 44 41.7	23.1
30	.284549	25 47 46.4	3.04	7.85	0.00	25 47 38.6	24.4
Dec. 4	.269675	26 0 7.4	3.03	7.96	0.00	26 0 2.5	26.8
9	.250475	26 13 21.2	3.00	8.02	0.00	26 13 32.2	23.7
14	.230845	26 23 15.9	2.96	8.02	0.00	26 23 10.1	27.5
15	.226897	26 24 47.5	2.95	8.01	0.00	26 24 58.5	23.2
16	.222951	26 26 9.7	2.94	8.00	0.00	26 26 4.6	26.8
17	.219005	26 27 22.6	2.93	7.99	0.01	26 27 33.5	22.8
19	.211123	26 29 20.0	2.90	7.95	0.00	26 29 30.8	23.0
21	.203287	26 30 40.4	2.88	7.89	0.00	26 30 51.2	22.0
22	.199387	26 31 7.3	2.87	7.86	0.00	26 31 2.3	25.2
23	.195498	26 31 25.8	2.86	7.83	0.00	26 31 36.5	23.1
24	.191643	26 31 36.0	2.84	7.80	0.00	26 31 31.0	25.5
28	.176424	26 31 2.0	2.79	7.65	0.00	26 30 57.1	25.3
29	.172686	26 30 36.8	2.77	7.61	0.00	26 30 47.2	21.4
1850.—Jan. 1	.161678	26 28 48.9	2.73	7.51	0.00	26 28 59.3	21.8
2	.158067	26 28 3.0	2.71	7.46	0.00	26 27 58.2	24.2
3	.154491	26 27 13.6	2.70	7.35	0.00	26 27 23.6	17.9
5	.147465	26 25 24.9	2.66	7.24	0.00	26 25 34.8	17.6
6	.144005	26 24 26.5	2.64	7.19	0.00	26 24 21.9	21.8
8	.137210	26 22 24.1	2.61	7.07	0.00	26 22 19.6	22.4
10	.130579	26 20 16.9	2.57	6.95	0.00	26 20 12.5	23.3
15	.114733	26 15 58.9	2.48	6.64	0.00	26 16 8.0	18.4
19	.102812	26 11 6.6	2.40	6.40	0.00	26 11 15.4	16.5
26	.083507	26 5 49.8	2.26	5.98	0.00	26 5 45.9	18.9
27	.080903	26 5 15.0	2.24	5.92	0.00	26 5 23.2	13.9
29	.075811	26 4 13.9	2.19	5.80	0.00	26 4 21.9	15.1
Feb. 1	.068426	26 3 1.6	2.13	5.63	0.00	26 2 58.1	17.4
2	.066041	26 2 42.6	2.11	5.57	0.00	26 2 39.1	20.5
3	.063681	26 2 25.6	2.09	5.51	0.00	26 2 33.2	14.0
4	.061354	26 2 11.0	2.07	5.46	0.00	26 2 7.6	18.6
5	.059063	26 1 58.4	2.05	5.40	0.00	26 2 5.8	13.6
10	.048044	+26 1 23.1	+1.95	5.35	0.00	+26 1 19.7	+15.6

II. SECOND OPPOSITION OF MARS.

MARS II.

Computation for Santiago Equatorial Observations.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax. α.	Parallax. δ.	Semidiameter in α.	Semidiameter in δ.	Def. ill.	Obs'd part.	Comp. δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	s.	″	s.	″	s.		° ′ ″	″
1851.—Dec. 16	.567110	9 9 29.78	+19 44 35.7	+0.24	+8.46	0.39	5.92	0.02	C.	+19 44 44.2	+19.6
	.610362	9 29.69	44 43.2	.08	8.66	0.39	5.92	.02	C	44 51 9	20.8
19	.550150	9 8.63	54 19.8	.27	8.62	0.40	6.06	.02	C.	54 28 4	20.7
	.580303	9 8.26	54 26.3	.16	8.81	0.40	6.06	.02	C.	54 35.1	20.9
	.597202	9 8.05	54 30.0	.09	8.88	0.40	6.06	.02	C.	54 38.9	20.5
20	.558789	8 54.73	19 58 6.1	.23	8.78	0.41	6.11	.03	S.	19 58 8.8	22.3
21	.552871	8 37.65	20 2 3.4	.24	8.83	0.41	6.15	.03	S.	20 2 6.1	21.2
22	.546569	8 17.19	6 14.4	.26	8.88	0.41	6.20	.03	S.	6 17.1	20.2
24	.561977	7 25.34	15 25.2	.18	9.17	0.42	6.29	.03	S.	15 28.1	21.1
25	.560700	6 54.49	20 18.2	.17	9.26	0.42	6.33	.03	S.	20 21.1	20.4
26	.529457	6 21.29	25 14.8	.29	9.13	0.43	6.38	.03	S.	25 17.6	22.1
	.573891	6 19.69	25 28.7	.10	9.40	0.43	6.38	.03	S.	25 31.7	22.4
27	.537696	5 43.33	30 36.1	.24	9.30	0.43	6.42	.03	S.	30 39.0	22.9
28	.544789	5 1.95	36 9.4	.20	9.44	0.43	6.46	.01	C.	36 18.8	21.1
29	.523539	4 18.46	41 44.7	.28	9.38	0.43	6.51	.01	C.	41 54.1	20.4
30	.523620	3 30.71	47 38.3	.27	9.48	0.44	6.55	.01	C.	47 47.8	18.7
31	.516725	2 40.02	53 40.0	.28	9.51	0.44	6.59	.01	C.	20 53 49.6	19.4
1852.—Jan. 1	.530423	1 45.25	20 59 59.5	.21	9.72	0.44	6.63	.00	C.	21 0 9.2	19.5
2	.513620	9 0 48.33	21 6 16.8	.27	9.68	0.44	6.66	.00	C.	6 26.5	22.0
4	.507212	8 58 44.18	19 27.2	.27	9.82	0.45	6.74	.00	C.	19 37.0	18.7
5	.512962	57 36.92	26 17.4	.23	9.95	0.45	6.77	.00	C.	26 37.3	31.8
6	.519886	56 26.54	33 14.8	.19	10.09	0.45	6.81	.00	C.	33 24.9	20.6
7	.509736	55 14.47	40 10.8	.22	10.10	0.46	6.84	.00	C.	40 20.9	22.8
8	.470027	54 1.91	46 59.0	.38	9.81	0.46	6.86	.00	C.	47 8.8	21.6
	.520396	53 58.03	47 20.5	.15	10.25	0.46	6.87	.00	C.	47 30.8	21.1
9	.500697	52 41.23	21 54 21.4	.23	10.20	0.46	6.90	.00	C.	21 54 31.6	21.9
10	.500841	51 20.30	22 1 33.7	.21	10.28	0.46	6.92	.00	C.	22 1 44.0	20.6
11	.520036	49 55.26	8 56.6	.11	10.45	0.46	6.94	.00	C.	9 7.0	20.6
12	.478583	48 33.03	15 54.4	.28	10.26	0.46	6.96	.00	C.	16 4.7	19.4
	.521972	48 29.24	16 13.3	.08	10.52	0.46	6.96	.00	C.	16 23.8	19.0
13	.503665	47 2.76	23 21.4	.15	10.51	0.47	6.98	.00	C.	23 31.9	19.7
14	.489949	45 33.83	30 30.9	.20	10.49	0.47	7.00	.00	C.	30 41.4	21.7
16	.474718	42 29.34	44 49.4	.23	10.51	0.47	7.03	.00	C.	44 59.9	19.8
17	.464911	40 54.85	22 51 52.6	.26	10.49	0.47	7.04	.00	C.	22 52 3.1	20.1
20	.458899	36 1.37	23 12 41.3	+ .24	10.61	0.47	7.06	.00	C.	23 12 52.0	20.0
	.511188	35 56.17	13 2.6	— .02	10.81	0.47	7.07	.00	C.	13 13.5	19.9
21	.438255	34 23.49	19 16.5	+ .32	10.47	0.47	7.07	.00	C.	19 27.0	21.8
22	.483702	32 38.32	26 9.3	.08	10.82	0.47	7.07	.00	C.	26 20.2	18.0
23	.476347	30 58.05	32 32.1	.10	10.82	0.47	7.06	.00	C.	32 42.9	19.2
24	.473829	29 17.07	38 47.0	.09	10.83	0.47	7.06	.00	C.	38 57.8	19.2
25	.440744	27 39.20	44 40.2	.23	10.66	0.47	7.05	.00	C.	44 50.9	17.0
27	.446278	24 17.06	23 56 18.1	.17	10.74	0.47	7.03	.00	C.	23 56 28.8	19.1
28	.456985	22 35.80	24 1 51.0	.10	10.80	0.47	7.01	.00	C.	24 2 1.8	17.1
29	.460799	20 56.49	7 8.4	.06	10.80	0.47	6.99	.00	C.	7 19.2	
30	.463149	19 18.15	12 11.9	.03	10.79	0.46	6.97	.00	C.	12 22.7	16.1
31	.457368	17 41.80	16 59.2	.04	10.77	0.46	6.95	.00	C.	17 10.0	15.9
Feb. 1	.418346	16 9.47	21 23.6	.21	10.59	0.46	6.93	.00	C.	21 34.2	16.1
2	.451873	14 32.84	25 53.0	+ .03	10.71	0.46	6.91	.00	C.	26 3.7	15.5
3	.469467	12 59.27	30 3.1	— .08	10.66	0.46	6.88	.00	C.	30 13.8	16.4
7	.416667	7 14.84	43 48.3	+ .11	10.46	0.45	6.75	.00	C.	43 58.8	16.3
8	.398496	5 54.78	46 37.8	.17	10.34	0.45	6.71	.00	C.	46 48.1	14.4
9	.393666	4 36.19	49 15.1	+ .18	10.28	0.44	6.67	.01	C.	49 25.4	14.4
	.462760	4 30.83	49 25.4	— .15	10.31	0.44	6.67	.01	C.	49 35.7	14.1
10	.411493	3 18.55	51 40.9	+ .08	10.32	0 44	6.63	.01	C.	51 51.3	14.5
11	.402675	2 5.71	53 48.5	+ .10	10.25	0.44	6.59	.01	C.	53 58.7	13.5
	.453969	8 2 2.03	53 54.7	— .14	10.21	0.44	6.59	.01	C.	54 5.0	13.6
13	.395952	7 59 47.96	+24 57 22.9	+0.10	+10.12	0.43	6.51	0.01	C.	+24 57 33.0	+13.5

Computation for Santiago Equatorial Observations—Continued.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax.		Semidiameter in		Def. ill.	Obs'd part.	Comp. δ.	$\Delta\delta$.
				α.	δ.	α.	δ.				
		h. m. s.	° ' "	s.	"	s.	"	s.		° ' "	"
1852.—Feb. 13	.443044	7 59 44.79	+24 57 27.3	—0.12	+10.10	0.43	6.51	0.01	C.	+24 57 37.4	+13.1
14	.404918	58 42.74	24 58 50.4	+ .04	10.09	0.43	6.46	.01	C.	24 59 0.5	14.4
15	.370468	57 43.63	25 0 1.1	.18	9.90	0.43	6.42	.01	C.	25 0 11.0	14.0
16	.387076	56 44.08	1 2.1	.09	9.93	0.42	8.37	.01	C.	1 12.0	13.2
17	.385869	55 49.13	1 49.0	.08	9.86	0.42	6.33	.01	C.	1 58.9	12.7
19	.368313	54 9.90	2 44.5	.13	9.67	0.42	6.23	.01	C.	2 54.2	10.8
20	.368193	53 24.90	2 54.2	.11	9.61	0.41	6.19	.01	C.	3 3.8	10.9
21	.373930	52 43.07	2 52.1	.07	9.57	0.41	6.14	.01	C.	3 1.7	10.8
22	.356132	52 5.60	2 38.8	.13	9.44	0.41	6.09	.01	C.	2 48.2	10.6
23	.350987	51 31.93	2 14.3	.14	9.35	0.40	6.04	.01	C.	2 23.6	10.1
24	.346851	50 59.85	1 39.0	.14	9.27	0.40	5.99	.01	C.	1 48.3	10.4
25	.349256	50 31.93	25 0 52.8	.12	9.21	0.40	5.94	.01	C.	1 2.0	11.4
26	.348459	50 7.53	24 59 56.5	+ .11	9.14	0.39	5.89	.01	C.	25 0 5.6	11.6
27	.397964	49 45.57	58 46.8	— .11	9.06	0.39	5.84	01	C.	24 58 55.9	9.9
28	.329031	49 29.22	57 35 9	+ .16	8.92	0.39	5.79	.01	C.	57 44.8	10.4
	.384230	49 28.34	57 31.5	— .06	9.02	0.39	5.79	.01	C.	57 40.5	9.6
29	.320987	49 15.00	56 11.5	+ .18	8.81	0.38	5.74	.01	C.	56 20.3	9.7
March 1	.328774	49 3.91	54 36.5	.14	8.79	0.38	5.69	.01	C.	54 45.3	10.2
2	.337017	48 56.16	52 52.5	.09	8.76	0.38	5.64	.01	C.	53 1.3	10.8
3	.317069	48 51.77	51 3.1	.16	8.60	0.37	5.59	.02	C.	51 11.7	11.6
4	.334692	48 50.47	49 0.8	.08	8.61	0.37	5.54	.02	C.	49 9.4	8.1
6	.341147	48 57.63	44 35.1	.03	8.47	0.36	5.44	.02	C.	44 43.6	9.0
7	.324551	49 5 38	42 13.4	.11	8.34	0.36	5.39	.02	C.	42 21.7	7.5
8	.327363	49 16.46	39 41.3	.06	8.30	0.36	5.34	.02	C.	39 49.6	8.4
9	.319176	49 30.34	37 3.4	.08	8.21	0.35	5.30	.02	C.	37 11.6	8.6
10	.303105	49 46.96	34 19.6	.13	8.08	0.35	5.25	.02	C.	34 27.7	10.0
11	.322512	50 7.10	31 22.7	.05	8.07	0.35	5.20	.02	C.	31 30.8	4.9
12	.289046	50 28.91	28 28.2	.16	7.88	0.34	5.16	.02	C.	28 36.1	6.1
	.327335	50 29.82	28 21.2	.03	8.00	0.34	5.15	.02	C.	28 29.2	6.4
13	.311102	50 54.68	25 16.6	.07	7.90	0.34	5.11	.03	C.	25 24.5	6.6
14	.315716	51 22.98	22 1.1	.05	7.84	0.34	5.06	.03	C.	22 9.0	5.8
15	.312831	7 51 53.63	+24 18 40 6	+0.05	+ 7.77	0.33	5.02	0.03	C.	+24 18 48.4	+ 6.7

MARS II.

Computation for Santiago Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular α.	Tabular δ.	Parallax.	Semid. α.	Semid. δ.	Def. ill. α.	Def. ill. δ.	Comp. δ.	Δ δ.
		h. m. s.	° ′ ″	″	s.	″	s.	″	° ′ ″	″
1851.—Dec. 19	.618077	9 9 7.80	+ 19 54 34.5	+ 8.89	0.43	6.06	0.02	0.03	+ 19 54 37.4	+ 22.9
21	.612255	8 36.52	20 2 18.0	9.04	.44	6.15	.02	.02	20 2 20.9	22.4
22	.609284	8 15.79	6 30.7	9.12	.44	6.20	.02	.02	6 33.6	23.9
24	.603229	7 24.13	15 37.0	9.27	.45	6.29	.02	.02	15 40.0	21.3
25	.600144	6 53.20	20 30.0	9.35	.45	6.33	.02	.02	20 33.0	25.3
26	.597016	6 18.85	25 36.0	9.42	.46	6.38	.02	.02	25 39.1	23.1
27	.593852	5 41.11	30 54.4	9.50	.46	6.42	.02	.02	30 57.5	23.5
28	.590643	4 59.99	36 24.8	9.57	.46	6.46	.02	.02	36 23.0	23.9
30	.584119	3 27.71	48 0.0	9.72	.47	6.55	.02	.01	48 3.2	20.9
31	.580802	2 36.63	20 54 3.7	9.80	.47	6.59	.02	.01	20 54 7.0	20.0
1852.—Jan. 1	.577444	1 42.30	21 0 17.3	9.87	.47	6.63	.02	.00	21 0 33.9	12.8
2	.574037	9 0 44.75	6 40.2	9.94	.48	6.66	.02	.00	6 56.8	18.7
4	.567141	8 58 40.26	19 51.4	10.07	.48	6.74	.02	.00	20 8.3	17.2
5	.563637	57 33.44	26 38.2	10.14	.49	6.77	.02	.00	26 55.2	25.5
6	.560114	56 23.53	33 31.6	10.20	.49	6.81	.02	.00	33 35.0	21.6
7	.556532	55 10.98	40 30.6	10.27	.49	6.84	.01	.00	40 34.0	21.8
8	.552929	53 55.63	47 34.5	10.32	.49	6.87	.01	.00	47 51.7	20.5
9	.549312	52 37.35	21 54 42.3	10.38	.50	6.90	.01	.00	21 54 45.8	21.7
10	.545639	51 16.61	22 1 53.2	10.43	.50	6.92	.01	.00	22 2 10.5	20.1
11	.541960	49 53.39	9 6.2	10.49	.50	6.94	.01	.00	9 23.6	18.0
12	.538227	48 27.81	16 20.4	10.54	.50	6.96	.01	.00	16 24.0	21.5
13	.534482	47 0.00	23 34.8	10.59	.50	6.98	.01	.00	23 52.4	17.2
14	.530728	45 30.11	30 48.7	10.63	.51	7.00	.01	.00	30 52.1	21.9
15	.526924	43 58.30	38 0.8	10.67	.51	7.02	.01	.00	38 18.5	17.9
16	.523128	42 24.74	45 10.1	10.71	.51	7.03	.00	.00	45 13.8	17.2
17	.519285	40 49.62	52 15.8	10.73	.51	7.05	.00	.00	52 33.6	16.6
18	.515455	39 13.06	22 59 16.8	10.76	.51	7.06	.00	.00	22 59 20.5	21.7
19	.511581	37 35.29	23 6 12.3	10.79	.51	7.06	.00	.00	23 6 30.1	22.8
20	.507730	35 56.50	13 1.3	10.81	.51	7.07	.00	.00	13 19.2	16.0
21	.503830	34 16.70	19 42.6	10.83	.51	7.07	.00	.00	20 0.5	16.0
22	.499963	32 36.69	26 15.7	10.84	.51	7.07	.00	.00	26 19.5	23.1
23	.496053	30 56.05	32 39.6	10.85	.51	7.06	.00	.00	32 57.5	14.3
24	.492171	29 15.21	38 53.8	10.85	.51	7.06	.00	.01	38 57.6	16.5
25	.488247	27 34.40	44 57.2	10.85	.51	7.05	.00	.01	45 15.1	14.9
27	.480487	24 13.62	56 29.5	10.84	.51	7.03	.00	.01	23 56 47.4	13.4
28	.476629	22 34.07	24 1 57.4	10.83	.51	7.01	.00	.01	24 2 1.2	19.8
29	.472735	20 55.32	7 12.1	10.80	.51	6.99	.00	.01	7 29.9	17.2
30	.468891	19 17.58	12 13.6	10.79	.51	6.97	.00	.01	12 17.5	14.6
31	.465033	17 41.07	17 1.4	10.77	.51	6.95	.00	.01	17 19.1	13.7
Feb. 1	.461214	16 5.92	21 35.0	10.74	.51	6.93	.00	.02	21 38.8	14.4
2	.457393	14 32.32	25 54.4	10.71	.51	6.91	.00	.02	26 12.0	13.5
3	.453616	13 0.43	29 59.3	10.67	.50	6.88	.00	.02	30 3.2	9.9
4	.449833	11 30.40	33 49.7	10.64	.50	6.85	.00	.02	34 7.2	15.1
7	.438672	7 12.99	43 52.3	10.49	.50	6.75	.00	.03	43 56.1	16.4
8	.435012	5 51.85	46 43.9	10.44	.49	6.71	.01	.03	46 47.7	14.9
9	.431360	4 33.27	49 20.8	10.39	.49	6.67	.01	.03	49 37.9	13.9
10	.427774	3 17.33	51 43.2	10.33	.49	6.63	.01	.03	51 46.9	14.5
11	.424185	8 2 4.17	53 51.1	10.27	.49	6.59	.01	.03	54 8.0	12.7
13	.417137	7 59 46.50	57 24.9	10.15	.48	6.51	.01	.03	57 41.6	14.8
14	.413661	58 42.19	24 58 51.1	10.08	.48	6.46	.01	.03	24 59 7.7	15.1
15	.410224	57 40.98	25 0 3.7	10.01	.47	6.42	.02	.03	25 0 20.2	13.6
16	.406836	56 42.97	1 3.2	9.94	.47	6.37	.02	.03	1 6.8	11.9
17	.403463	55 48.19	1 49.7	9.87	.47	6.33	.02	.03	2 5.9	11.2
18	.400148	54 56.71	2 23.4	9.80	.46	6.28	.02	.03	2 27.0	12.4
19	.396866	54 8.56	2 44.8	9.72	.46	6.23	.02	.03	3 0.8	7.5
20	.393612	53 23.80	2 54.3	9.65	.46	6.18	.03	.03	2 57.8	10.7
21	.390395	7 52 42.42	+ 25 2 52.0	+ 9.57	.45	6.14	0.03	0.03	+ 25 3 7.7	+ 9.7

Computation for Santiago Meridian Observations—Continued.

Date.	Wash. M.T. in dec. of day.	Tabular α.	Tabular δ.	Parallax.	Semid. α.	Semid. δ.	Def. ill. α.	Def. ill. δ.	Comp. δ.	Δ δ.
		h. m. s.	° ′ ″	″	″	s.	″		° ′ ″	″
1852.—Feb. 22	.387222	7 52 4.46	+ 25 2 38.2	+ 9.49	0.45	6.09	0.03	0.03	+ 25 2 53.8	+ 9.9
23	.384098	51 29.94	2 13.3	9.41	.45	6.04	.03	.03	2 28.7	10.8
24	.381020	50 58.84	1 37.6	9 33	.44	5.99	.03	.03	1 40.9	12.7
25	.377959	50 31.18	25 0 51.4	9.25	.44	5.94	.03	.03	25 1 6.6	6.5
26	.374957	50 6.93	24 59 54.9	9.17	.43	5.89	.04	.03	24 59 58.2	10.7
27	.371975	49 46.07	58 48.6	9.09	.43	5.84	.04	.03	59 3.5	8.7
28	.369056	49 28.58	57 32.7	9.01	.43	5.79	.04	.03	57 35.9	11.4
29	.366147	49 14.43	56 7.4	8.93	.42	5.74	.04	.03	56 22.1	1.0
March 1	.363303	49 3.59	54 33.1	8.85	.42	5.69	.04	.03	54 36.3	12.6
2	.360479	48 56.02	52 50.0	8.77	.42	5.64	.04	.03	53 4.5	3.0
3	.357697	48 51.67	50 58.4	8.69	.41	5.59	.04	.03	51 12.7	7.0
4	.354954	48 50.47	48 58.3	8.61	.41	5.54	.04	.03	49 12.4	7.9
6	.349570	48 57.50	44 34.1	8.44	.40	5.44	.04	.03	44 48.0	6.5
7	.346944	49 5.59	42 10.1	8.36	.40	5.39	.04	.03	42 13.1	11.7
8	.344334	49 16.67	39 38.7	8.28	.39	5 34	.04	.03	39 52.3	6.5
9	.341774	49 30.69	36 59.7	8.20	.39	5.30	.05	.03	37 2.7	8.5
10	.339231	49 47.62	34 13.4	8.13	.39	5.25	.05	.03	34 26.8	9.1
11	.336734	50 7.40	31 20.2	8.05	.38	5.20	.05	.03	31 23.1	8.7
12	.334258	50 29.99	28 19.9	7.97	.38	5.15	.05	.03	28 33.0	5.2
13	.331830	50 55.33	25 12.6	7.90	.37	5.11	.05	.03	25 15.4	6.6
14	.329414	51 23.38	21 58.4	7.82	.37	5.06	.05	.03	22 11.3	5.6
15	.327043	7 51 54.09	+ 24 18 37.5	+ 7.75	0.37	5.01	0.05	+ 0.03	+ 24 18 40.3	+ 7.6

In the Santiago meridian series for *Mars* II are a number of observations, which were made with the micrometer in the eye-piece of the meridian-circle, and which, in addition to the measurement of absolute declination, give a measurement of distance from some one of the regular comparison-stars. In such cases we are put in possession of two determinations made at the same time. The meridian observations may, in fact, be classed under three categories.

1. *Mars* observed on fixed thread.
2. Star observed on fixed thread, and *Mars* shortly after on the movable thread.
3. *Mars* observed on fixed thread, and star on the movable thread.

The first of these gives in each case one normal meridian observation.

The second furnishes a determination of the star's place, and also a micrometric comparison of *Mars* with the star.

The third affords both an absolute measurement of *Mars* belonging with the first series, and a micrometric determination like those included in the second division of the second category.

In strictness, the *Mars*-determinations of the second category, being micrometric, ought to be combined in the same series with those of the third; but since the precise character of these determinations was only comprehended after study of the original manuscripts, at which time these cases had already been incorporated with the absolute determinations of the first category, a repetition of the computation has not appeared sufficiently important to call for a new distribution and discussion.

Consequently, our series, "*Mars* II, Santiago meridian," contains the *Mars*-observations of the first two divisions and the absolute determinations of the third; the star-observations of the second being already included in our discussion of the comparison-stars, and the micrometric measurements of the third furnishing us the annexed new group.

MARS II.

Computation for Santiago Meridian Supplementary Observations.

Date.	Limb.	$t-T'$.	Star N°.	Star's δ.	Meas'd $D\delta$.	Refr.	Obs'd δ.	$\Delta\delta$.
		d.		° ′ ″	′ ″	″	° ′ ″	″
1851.—Dec. 21	S.	− 40.387745	108	+ 20 2 22.84	− 0 23.18	0.01	+ 20 1 59.65	+ 22.2
22	S.	39.390716	108	20 2 22.72	+ 3 52.63	0.17	20 6 15.52	18.1
26	S.	35.402984	105	20 27 42.57	− 2 25.22	0.11	20 25 17.24	21.9
27	S.	34.406148	105	20 27 42.49	+ 2 56.50	0.13	20 30 39.11	18.4
30	S.	31 415881	104	20 41 5.98	+ 6 36.13	0.30	20 47 42.41	20.8
31	S.	30.419198	99	20 57 18.14	− 3 31.13	0.17	20 53 46.84	20.2
1852.—Jan. 1	N.	29.422556	100	21 1 43.43	− 1 21.27	0.07	21 0 22.09	11.8
4	N.	26.432859	101	21 16 47.71	+ 3 1.53	0.14	21 19 49.38	18.9
5	N.	25.436363	98	21 29 17.95	− 2 46.03	0.13	21 26 31.79	23.4
10	N.	20.451361	95	22 2 25.24	− 0 36.58	0.03	22 1 48.63	21.9
16	S.	14.476872	s.	22 46 31.42	− 1 38.02	0.08	22 44 53.32	20.5
17	N.	13.480715	89	22 51 33.75	+ 0 40.49	0.03	22 52 14.27	19.3
25	N.	5.511753	79	23 45 33.88	− 0 32.67	0.03	23 45 1.18	14.0
27	N.	− 3.519513	77	23 58 1.50	− 1 33.00	0.08	23 56 28.42	19.0
Feb. 1	S.	+ 1.461214	68	24 25 1.60	− 3 39.23	0.19	24 21 22.18	16.6
2	N.	2.457393	68	24 25 1.63	+ 0 56.41	0.05	24 25 58.09	13.9
4	N.	4.449833	64	24 28 59.75	+ 4 51.93	0.23	24 33 51.91	15.3
8	S.	8.435012	62	24 46 56.93	− 0 24.02	0.02	24 46 32.89	14.8
9	N.	9.431360	62	24 46 56.98	+ 2 26.06	0.14	24 49 23.18	14.7
18	S.	18.400148	57	25 0 18.36	+ 1 53.10	0.11	25 2 11.57	15.4
19	N.	19.396866	57	25 0 18.42	+ 2 30.34	0.14	25 2 48.90	11.9
20	S.	20.393612	57	25 0 18.48	+ 2 27.83	0.14	25 2 46.45	11.4
21	N.	21.390395	57	25 0 18.54	+ 2 42.54	0.15	25 3 1.23	6.5
Mar. 12	N.	41.334258	54	24 28 25.93	+ 0 2.23	0.00	24 28 28.16	4.8
13	S.	42.331830	54	24 28 26.00	− 3 17.16	0.18	24 25 8.66	6.7
14	N.	43.329414	55	24 18 57.55	+ 3 6.83	0.17	24 22 4.55	6.8
15	S.	+ 44.327043	55	+ 24 18 57.61	− 0 24 30	0.02	+ 24 18 33.29	+ 7.0

MARS II.

Computation for Washington Equatorial Observations.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax.		Semid.		Obs. part.	Comp'd δ.	$\Delta\delta$.
				α.	δ.	α.	δ.			
		h. m. s.	° ′ ″	s.	″	s.	″		° ′ ″	″
1852.—Jan. 24	.424491	8 29 22.16	+ 23 38 28.7	+ 0.38	− 3.94	0.47	7.06	C.	+ 23 38 24.8	+ 16.6
26	.416910	8 26 0.58	23 50 25.9	0.38	3.89	0.47	7.04	C.	23 50 22.0	
30	.450868	8 19 19.35	24 12 8.3	0.16	3.31	0.46	6.97	C.	24 12 5.0	
Feb. 2	.407664	8 14 36.96	24 25 41.8	0.31	3.52	0.46	6.91	C.	24 25 38.3	15.9
3	.409033	8 13 4.50	+ 24 29 48.7	+ 0.28	− 3.41	0.46	6.88	C.	+ 24 29 45.3	+ 16.7

MARS II.

Computation for Greenwich Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular.		Parallax.	Semid.		Comp. δ.	$\Delta\delta$.
		α.	δ.		α.	δ.		
		h. m. s.	° ′ ″	″	s.	″	° ′ ″	″
1851.—Dec. 8	.451842	9 8 3.30	+19 28 48.4	−5.36	0.37	5.53	+19 28 43.04	+14.84
26	.401578	9 6 25.85	20 24 35.0	6.00	0.42	6.37	20 24 29.00	20.56
1852.—Jan. 5	.368288	8 57 46.79	21 25 17.9	6.18	0.45	6.76	21 25 11.72	21.59
7	.361191	8 55 25.46	21 39 7.9	6.20	0.46	6.83	21 39 1.70	21.03
9	.353970	8 52 52.88	21 53 18.0	6.20	0.46	6.89	21 53 11.80	22.40
20	.312426	8 36 15.96	23 11 41.5	6.10	0.47	7.06	23 11 35.40	18.80
22	.304661	8 32 56.38	23 24 59.3	6.06	0.47	7.07	23 24 53.24	19.18
23	.300771	8 31 15.81	23 31 25.2	6.04	0.47	7.06	23 31 19.16	20.82
28	.281321	8 22 53.52	24 0 54.0	5.90	0.47	7.01	24 0 48.10	18.91
29	.277449	8 21 14.61	24 6 11.4	5.86	0.47	6.99	24 6 5.54	17.57
30	.273589	8 19 36.67	24 11 15.5	5.83	0.46	6.97	24 11 9.67	17.54
Feb. 3	.258300	8 13 18.31	24 29 12.5	5.69	0.46	6.88	24 29 6.81	15.95
6	.247046	8 8 53.20	24 40 8.0	5.58	0.45	6.79	24 40 2.42	15.15
9	.236031	8 4 48.47	24 48 51.1	5.46	0.45	6.68	24 48 45.64	14.64
10	.232419	8 3 32.01	24 51 16.3	5.42	0.44	6.64	24 51 10.88	14.65
11	.228840	8 2 18.29	24 53 27.2	5.38	0.44	6.60	24 53 21.82	14.06
14	.218293	7 58 54.55	24 58 35.2	5.26	0.43	6.47	24 58 29.94	12.85
18	.204739	7 55 6.53	25 2 17.8	5.10	0.42	6.29	25 2 12.70	13.36
20	.198193	7 53 32.30	25 2 53 5	5.02	0.41	6.19	25 2 48.48	10.49
26	.179490	7 50 11.42	25 0 6.8	4.79	0.39	5.90	25 0 2.01	9.44
28	.173571	7 49 31.75	24 57 48.4	4.72	0.39	5.80	24 57 43.68	9.72
Mar. 2	.164985	7 48 57.24	24 53 10.9	4.61	0.38	5.65	24 53 6.29	9.62
3	.162189	7 48 52.26	24 51 20.9	4.57	0.37	5.60	21 51 16.33	9.89
4	.159435	7 48 50.46	24 49 22.5	4.54	0.37	5.55	24 49 17.96	8.61
5	.156725	7 48 51.81	24 47 15.9	4.50	0.37	5.50	24 47 11.40	9.67
6	.154047	7 48 56.26	24 45 1.3	4.47	0.36	5.45	24 44 56.83	7.89
8	.148794	7 49 14.26	24 40 8.9	4.40	0.36	5.35	24 40 4.50	7.62
9	.146214	7 49 27.71	24 37 31.5	4.37	0.35	5.30	24 37 27.13	8.36
12	.138691	7 50 25.34	24 28 55.8	4.27	0.34	5.16	24 28 51.53	7.65
17	.126778	7 52 56.05	24 12 18.7	4.12	0.33	4.93	24 12 14.58	6.94
18	.124486	7 53 33.96	24 6 39.5	4.09	0.33	4.89	24 8 35.41	5.34
20	.119983	7 54 57.16	24 1 1.9	4.04	0.32	4.81	24 0 57.86	6.16
22	.115593	7 56 29.85	23 52 58.9	3.99	0.31	4.71	23 52 54.91	6.69
23	.113437	7 57 19.62	23 48 48.0	3.96	0.31	4.66	23 48 44.04	7.29
25	.109200	7 59 5.76	23 40 7.5	3.91	0.30	4.57	23 40 3.59	5.94
27	.104061	8 1 0.35	+23 31 2.3	−3.86	0.30	4.48	+23 30 58.44	+5.09

MARS II.

Computation for Cape Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular α.	Tabular δ.	Parallax.	Def. ill.	Comp. δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	″	″	° ′ ″	″
1851.—Dec. 22	.362637	9 8 21.2	+ 20 5 25.9	+ 9.17	S. 0.02	+ 20 5 36.08	+ 19.07
26	.350404	9 6 27.6	24 19.2	9.48	.02	24 28.69	18.74
29	.340817	9 4 26.8	40 41.3	9.70	.01	40 51.01	18 52
30	.337546	9 3 39.8	46 31.8	9.78	.01	46 41.59	19.00
1852.—Jan. 1	.330888	9 1 56.0	20 58 44.1	9.92	.01	20 58 54.02	19.49
2	.327503	9 0 59.3	21 5 4.7	9.99	.01	21 5 14.69	19.27
3	.324079	8 59 59.3	11 34.3	10.06	.01	11 44.36	17.97
5	.317128	8 57 50.2	24 57.1	10.19	.01	25 7.29	18.21
9	.302822	8 52 56.9	21 52 55.9	10.44	.00	21 53 6.34	17.62
10	.299167	8 51 36.8	22 0 6.2	10.49	.00	22 0 16.69	17.28
12	.291772	8 48 49.2	14 32.8	10.59	.00	14 43.39	17.76
13	.288034	8 47 21.9	21 47.4	10.64	.00	21 58.04	18.34
14	.284271	8 45 52.5	29 1.5	10.68	.00	29 12.18	18.21
15	.280486	8 44 21.2	36 14.1	10.72	.00	36 24.82	17.36
16	.276682	8 42 48.1	22 43 24.3	10.76	.00	22 43 35.06	17.52
19	.265161	8 37 59.6	23 4 30.1	10.85	.00	23 4 40.95	17.00
20	.261293	8 36 21.0	11 20.6	10.87	.00	11 31.47	16.47
21	.257415	8 34 41.6	18 3.9	10.89	.00	18 14.79	17.67
22	.253529	8 33 1.5	24 39.1	10.90	.00	24 50.00	16.18
23	.249639	8 31 21.0	31 5.5	10.91	.01	31 16.41	15.74
24	.245743	8 29 40.2	37 22.1	10.91	.01	37 33.01	15.13
26	.237958	8 26 18.7	49 23.2	10.91	.01	49 34.12	15.51
27	.234070	8 24 38.4	23 55 6.4	10.90	.01	23 55 17.31	14.37
29	.226314	8 21 19.7	24 5 55.4	10.88	.01	24 6 6.29	14.67
Feb. 2	.210958	8 14 55.4	24 51.5	10.78	.02	25 2.29	13.18
3	.207163	8 13 23.0	29 0.1	10.74	.02	29 10.85	14.11
4	.203386	8 11 52.5	32 54.0	10.71	.02	33 4.72	13.73
5	.199631	8 10 24.0	36 33.2	10.66	.02	36 43.87	13.03
6	.195906	8 8 57.6	39 57.8	10.62	.02	40 8.43	13.19
7	.192204	8 7 33.5	43 7.5	10.57	.02	43 18.08	12.83
9	.184884	8 4 52.5	48 43.1	10.47	.03	48 53.58	11.37
10	.181271	8 3 35.9	51 9.0	10.41	.03	51 19.42	11.16
11	.177687	8 2 22.0	53 20.7	10.35	.03	53 31.06	10.83
12	.174138	8 1 11.0	55 18.0	10.29	.03	55 28.30	11.73
13	.170620	8 0 2.9	57 1.3	10.23	.03	57 11.54	12.60
14	.167138	7 58 57.8	24 58 30.9	10.16	.03	24 58 41.07	12.23
16	.160284	7 56 57.1	25 0 49.6	10.03	.03	25 0 59.64	11.01
17	.156911	7 56 1.5	1 39.3	9.95	.03	1 49.27	10.04
18	.153578	7 55 9.2	2 16.1	9.88	.03	2 26.00	10.18
19	.150281	7 54 20.2	2 40.7	9.81	.03	2 50.53	9.91
20	.147025	7 53 34.6	2 53.1	9.73	.03	3 2.85	8.53
21	.143807	7 52 52.4	2 53.7	9.66	.03	3 3.38	11.12
23	.137488	7 51 38.2	2 20.5	9.50	.03	3 30.02	8.47
24	.134390	7 51 6.2	1 47.2	9.42	.03	1 56.64	7.67
25	.131330	7 50 37.7	25 1 3.5	9.34	.03	25 1 12.85	7.48
28	.122386	7 49 32.6	+ 24 57 52.3	+ 9.10	S. 0.03	+ 24 58 1.42	+ 6.96

MARS II.

Computation for Kremsmünster Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular.		Parallax.	Def. ill.	Comp'd δ.	Δ δ.
		α.	δ.				
		h. m. s.	° ′ ″	′	″	° ″ ′	″
1852.—Jan. 20	.273314	8 36 19.84	+ 23 11 25.6	+ 5.41	0.00	+ 23 11 31.0	+ 16.0
24	.257762	8 29 38.95	23 37 26.7	5.32	0.01	23 37 32.0	17.5
Feb. 8	.200553	8 6 10.72	24 46 4.8	4.84	0.03	24 46 9.7	15.3
9	.196907	8 4 51.53	24 48 45.1	4.80	0.03	24 48 49.9	15.2
10	.193291	8 3 34.96	24 51 10.9	4.76	0.03	24 51 15.7	15.3
24	.146415	7 51 5.85	25 1 47.0	4.27	0.03	25 1 51.3	12.7
25	.143358	7 50 37.38	25 1 3.2	4.24	0.03	25 1 7.4	9.2
26	.140345	7 50 12.33	25 0 9.1	4.20	0.03	25 0 13.3	13.2
Mar. 6	.114883	7 48 56.04	24 45 6.7	3.93	0.03	24 45 10.7	7.7
7	.112239	7 49 3.43	24 42 44.6	3.90	0.03	24 42 48.5	7.4
8	.109625	7 49 13.80	24 40 15.0	3.87	0.03	24 40 18.9	11.5
14	.094659	7 51 16.54	24 22 44.7	3.71	0.03	24 22 48.4	4.1
16	.089923	7 52 19.33	+ 24 15 59.7	+ 3.66	0.03	+ 24 16 3.4	+ 7.4

III. FIRST CONJUNCTION OF VENUS.

VENUS I.

Computation for Santiago Equatorial Observations.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax. α.	Parallax. δ.	Semidiameter. α.	Semidiameter. δ.	Ob'd part.	Comp'd δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	s.	″	s.	″		° ′ ″	″
1850.—Oct. 19	.338449	16 40 26.70	— 26 32 40.3	— 0.94	+ 7.03	1.14	15.23	N.	— 26 32 18.0	+ 3.9
20	.326075	16 44 13.27	26 41 56.1	0.94	6.67	1.15	15.44	N.	26 41 34.0	2.9
22	.326958	16 51 45.27	26 59 2.9	0.97	6.87	1.19	15.86	N.	26 58 40.2	1.9
23	.323271	16 55 26.53	27 6 44.6	0.98	6.82	1.21	16.08	N.	27 6 21.7	4.0
24	.311141	16 59 3.18	27 13 50.1	0 98	6.45	1.22	16.30	N.	27 13 27.3	3.6
25	.329782	17 2 42.57	27 20 35.1	1.02	7.26	1.24	16.54	N.	27 20 11.3	1.5
26	.313050	17 6 13.25	27 26 33.6	1.02	6.70	1.26	16.78	N.	27 26 10.1	+ 4.0
29	.290132	17 16 27.91	27 41 27.4	1.02	6.08	1.32	17.52	N.	27 41 3.8	— 1.3
	.350424	17 16 40.02	27 41 42.5	1.09	8.59	1.32	17.53	N.	27 41 16.4	1.0
30	.326339	17 19 54.06	27 45 31.5	1.10	7.70	1.34	17.79	N.	27 45 6.0	— 0.5
31	.328546	17 23 8.92	27 48 55.1	1.12	7.92	1.36	18.06	N.	27 48 29.1	+ 1.2
Nov. 1	.313547	17 26 16.87	27 51 44.4	1.12	7.40	1.39	18.33	N.	27 51 18.7	1.0
2	.323315	17 29 24.60	27 54 6.4	1.15	7.97	1.41	18.61	N.	27 53 39.8	1.0
4	.300149	17 35 17.83	27 57 13.6	1.15	7.21	1.45	19.19	N.	27 56 47.2	1.4
6	.311707	17 40 56.03	27 58 22.1	1.21	8.06	1.50	19.81	N.	27 57 54.2	+ 0.9
7	.310076	17 43 35.27	27 58 11.4	1.23	8.16	1.52	20.13	N.	27 57 43.1	— 1.2
8	.306848	17 46 8.19	27 57 31.4	1.25	8.31	1.55	20.45	N.	27 57 2.6	— 0.5
10	.280189	17 50 51.96	27 54 47.0	1.23	7.24	1.60	21.13	N.	27 54 18.7	+ 0.1
11	.315959	17 53 10.18	27 52 36.0	1.33	9.24	1.62	21.48	N.	27 52 5.3	+ 0.4
13	.314107	17 57 14.48	27 46 57.5	1.37	9.15	1.67	22.20	N.	27 46 26.1	— 0.3
14	.315130	17 59 5.17	27 43 25.9	1.40	9.91	1.70	22.57	N.	27 42 53.4	+ 1.2
15	.281037	18 0 44.20	27 39 35.5	1.36	8.32	1.73	22.94	N.	27 39 4.2	— 0.1
	.312755	18 0 47.32	27 39 27.5	1.42	10.04	1.73	22.95	N.	27 38 54.5	+ 0.2
16	.307103	18 2 20.74	27 35 2.4	1.44	9.99	1.76	23.33	N.	27 34 29.1	+ 1.4
17	.292045	18 3 44.74	27 30 13.0	1.44	9.43	1.78	23.72	N.	27 29 39.8	— 0.7
18	.309470	18 5 12.30	27 24 45.9	1.49	10.70	1.81	24.12	N.	27 24 11.1	+ 1.2
21	.291491	18 7 52.89	27 6 3.1	1.54	10.58	1.90	25.34	N.	27 5 26.2	1.5
24	.303418	18 9 14.34	26 42 57.9	1.64	12.36	1.99	26.60	N.	26 42 18.9	+ 0.7
25	.308236	18 9 20.28	26 34 18.8	1.66	13.05	2.02	27.03	N.	26 33 38.7	— 0.4
26	.334374	18 9 15.14	26 24 58.7	1.66	15.11	2.04	27.46	N.	26 24 16.1	+ 0.5
28	.304189	18 8 33.25	26 5 37.1	1.73	14.02	2.10	28.28	N.	26 4 54.8	— 1.2
29	.312331	18 7 55.47	25 54 58.1	1.75	14.98	2.13	28.69	N.	25 54 14.4	+ 3.4
30	.306782	18 7 7.43	25 43 58.1	1.77	15.06	2.15	29.09	N.	25 43 13.9	— 0.7
Dec. 3	.302140	18 3 39.41	25 7 50.0	— 1.83	16.10	2.23	30.24	S.	25 8 4.1	+ 0.7
1851.—Jan. 6	.705480	17 4 58.76	17 38 19.2	+ 1.52	12.99	1.85	26.37	S.	17 38 32.6	6.8
7	.705508	17 5 19.04	17 34 59.7	1.49	12.68	1.82	25.95	S.	17 35 13.0	+ 6.6
8	.665513	17 5 47.43	17 32 28.5	1.46	12.33	1.79	25.54	S.	17 32 41.7	— 1.7
9	.662595	17 6 25.93	17 30 31.5	1.44	12.16	1.76	25.13	S.	17 30 44.5	2.3
10	.657680	17 7 13.32	17 29 13.7	1.42	12.07	1.73	24.72	S.	17 29 26.3	2.8
11	.642953	17 8 8.85	17 28 33.0	1.40	12.35	1.70	24.31	S.	17 28 45.0	4.3
12	.657832	17 9 14.79	17 28 26.7	1.37	11.52	1.67	23.91	S.	17 28 39.1	4.5
14	.662896	17 11 50.21	17 29 51.6	1.31	10.82	1.62	23.12	S.	17 30 3.9	1.7
15	.658800	17 13 19.37	17 31 17.7	1.29	10.72	1.59	22.74	S.	17 31 29.8	5.5
16	.657134	17 14 56.36	17 33 10.4	1.27	10.55	1.57	22.37	S.	17 33 22.2	3.1
17	.657131	17 16 40.95	17 35 27.2	1.25	10.32	1.54	22.00	S.	17 35 38.9	2.2
18	.649177	17 18 31.82	17 38 4.7	1.24	10.36	1.52	21.64	S.	17 38 16.0	4.5
20	.648941	17 22 35.99	17 44 19.2	1.19	9.94	1.47	20.93	S.	17 44 30.2	3.3
24	.650433	17 32 0.99	17 59 37.4	1.11	9.10	1.38	19.63	S.	17 59 48.0	4.5
26	.650814	17 37 18.12	18 8 8.6	1.08	8.74	1.34	19.01	S.	18 8 18.9	2.6
27	.651362	17 40 4.74	18 12 30.5	1.06	8.56	1.32	18 72	S.	18 12 40.7	4.7
28	.652529	17 42 56.47	18 16 54.3	1.04	8.36	1.30	18.44	S.	18 17 4.4	3.7
Feb. 5	.651360	18 8 28.42	18 49 50.3	0.92	7.30	1.15	16.38	S.	18 49 59.4	3.2
	.659449	18 8 30.10	18 49 52.0	0.91	7.08	1.15	16.38	N.	18 49 28.5	5.3
6	.662710	18 12 0.78	18 53 22.4	0.89	6.88	1.14		C.	18 53 15.6	4.7
7	.655149	18 15 30.89	18 56 35.0	0.89	6.97	1.12		C.	18 56 28.0	2.3
10	.658692	18 26 28.67	— 19 4 52.3	+ 0.85	+ 6.57	1.08		C.	— 19 4 45.7	— 5.0

VENUS I.

Computation for Santiago Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular. α.	Tabular. δ.	Parallax.	Semi-diameter. α.	Semi-diameter. δ.	Comp'd δ.	Δ δ.
		h. m. s.	° ′ ″	″	s.	″	° ′ ″	″
1850.—Oct. 19	.098602	16 39 30.96	— 26 30 20.4	+ 1.77	1.13	15.18	—26 30 3.5	+ 13.1
20	.098524	16 43 21.26	26 39 50.9	1.75	1.15	15.39	26 39 33.8	12.2
21	.098421	16 47 8.90	26 48 48.2	1.73	1.16	15.59	26 48 30.9	6.0
22	.098294	16 50 54.12	26 57 12.3	1.72	1.18	15.81	26 56 54.8	5.4
23	.098131	16 54 36.76	27 5 3.2	1.71	1.20	16.03	27 4 45.5	7.0
24	.097921	16 58 17 66	27 12 21.0	1.70	1.22	16.25	27 12 3.0	8.5
25	.097713	17 1 53.64	27 19 5.8	1.69	1.23	16.48	27 18 47.6	6.4
26	.097453	17 5 27.54	27 25 17.7	1.68	1.25	16.72	27 24 59.3	(22.1)
27	.097151	17 8 58.17	27 30 56.9	1.68	1.27	16.96	27 30 38.3	5.7
28	.096810	17 12 25.36	27 36 3.6	1.68	1.29	17.21	27 35 44.7	7.0
30	.096008	17 19 8.61	27 44 40.2	1.68	1.33	17.73	27 44 20.8	3.2
31	.095536	17 22 24.25	27 48 10.5	1.69	1.35	18.00	27 47 50.9	5.5
Nov. 1	.095015	17 25 35.61	27 51 9.5	1.70	1.38	18.27	27 50 49.5	8.1
2	.094440	17 28 42.49	27 53 37.0	1.71	1.40	18.55	27 53 16.7	3.7
4	.093128	17 34 41.84	27 56 59.6	1.75	1.44	19.13	27 56 38.7	(44.5)
5	.092383	17 37 33.70	27 57 55.2	1.77	1.46	19.43	27 57 34.0	2.6
7	.090697	17 43 0.80	27 58 16.3	1.83	1.51	20.06	27 57 54.4	5.8
8	.089752	17 45 35.41	27 57 42.6	1.86	1.53	20.38	27 57 20.3	6.2
10	.087637	17 50 25.43	27 55 8.0	1.93	1.59	21.05	27 54 45.0	4.8
11	.086462	17 52 40.22	27 53 7.7	1.98	1.61	21.40	27 52 44.3	6.3
13	.083861	17 56 47.89	27 47 42.2	2.08	1.66	22.11	27 47 18.0	2.0
14	.082428	17 58 40.15	27 44 17.6	2.14	1.69	22.48	27 43 53.0	3.1
15	.080901	18 0 24.32	27 40 25.4	2.20	1.72	22.86	27 40 0.3	7.6
16	.079275	18 2 0.09	27 36 5.6	2.27	1.75	23.24	27 35 40.1	5.7
17	.077551	18 3 27.19	27 31 18.3	2.34	1.77	23.63	27 30 52.3	+ 2.8
18	.075722	18 4 45.33	27 26 3.6	2.42	1.80	24.03	27 25 37.1	— 0.6
19	.073787	18 5 54.22	27 20 21.5	2.50	1.83	24.43	27 19 54.6	+ 4.2
20	.071743	18 6 53.60	27 14 12.0	2.58	1.86	24.84	27 13 44.6	3.3
21	.069585	18 7 43.21	27 7 35.1	2.67	1.89	25.25	27 7 7.2	4.6
23	.064920	18 8 52.27	26 52 58.3	2.87	1.95	26.08	26 53 29.5	1.4
26	.056229	18 9 17.66	26 27 33.6	3.21	2.03	27.34	26 27 3.1	2.6
27	.054144	18 9 4.73	26 18 7.5	3.33	2.06	27.72	26 17 36.4	2.0
28	.051136	18 8 41.00	26 8 12.7	3.46	2.09	28.18	26 7 41.1	5.0
30	.044068	18 7 21.16	25 46 55.4	3.73	2.14	28.99	25 46 22.7	3.0
Dec. 2	.037882	18 5 18.58	25 23 38.2	4.02	2.19	29.77	25 23 4.4	3.1
4	.030533	18 2 34.98	24 58 22.0	4.35	2.24	30.50	24 57 47.1	4.3
5	.026693	18 0 58.61	24 44 59.5	4.51	2.26	30.84	24 44 24.1	3.9
8	.014558	17 55 16.90	24 2 3.1	5.03	2.32	31.74	24 1 26.3	3.1
10	.006039	17 50 51.83	23 31 17.5	5.38	2.34	32.19	23 30 39.9	5.7
(12)	.997259	17 46 4.35	22 59 8.6	5.74	2.36	32.53	22 58 30.3	6.5
(13)	.992793	17 43 34.61	22 42 39.8	5.91	2.36	32.65	22 43 6.6	3.3
21	.955584	17 21 17.61	20 14 6.6	7.16	2.28	32.10	20 14 31.6	5.6
22	.948570	17 19 8.96	19 59 1.0	7.24	2.26	31.87	19 59 25.6	1.6
29	.921792	17 8 0.45	18 31 3.6	7.44	2.08	29.59	18 31 25.7	3.7
31	.915076	17 6 15.32	18 12 50.0	7.39	2.02	28.79	18 13 11.4	5.1
1851.—Jan. 5	.900464	17 4 49.43	17 41 32.2	7.09	1.87	26.71	17 41 51.8	0.0
6	.897880	17 5 1.92	17 37 37.4	7.00	1.84	26.28	17 37 56.7	0.0
7	.895402	17 5 23.97	17 34 26.7	6.91	1.81	25.86	17 34 45.6	0.4
8	.893033	17 5 55.41	17 31 58.3	6.82	1.78	25.44	17 32 16.9	0.0
9	.890770	17 6 36.02	17 30 10.3	6.72	1.75	25.04	17 30 28.6	1.2
10	.888610	17 7 25.57	17 29 1.0	6.62	1.72	24.63	17 29 19.0	0.8
11	.886552	17 8 23.88	17 28 28.3	6.51	1.69	24.22	17 28 46.0	+ 2.4
12	.884593	17 9 30.71	17 28 30.0	6.40	1.66	23.82	17 28 47.4	— 0.9
13	.882731	17 10 45.85	17 29 4.0	6.29	1.63	23.43	17 29 21.1	+ 0.4
14	.880960	17 12 9.07	— 17 30 8.1	+ 6.18	1.61	23.04	—17 30 25.0	+ 0.7

VENUS I.

Computation for Santiago Meridian Observations—Continued.

Date.	Wash. M.T. in dec. of day.	Tabular. α.	Tabular. δ.	Parallax.	Semi-diameter. α.	Semi-diameter. δ.	Comp'd δ.	$\Delta\delta$.
	d.	h. m. s.	° ′ ″	″	s.	″	° ′ ″	″
1851.—Jan. 15	.879281	17 13 40.14	— 17 31 40.4	+ 6.07	1.58	22.65	— 17 31 57.0	+ 0.3
16	.877686	17 15 18.73	17 33 38.6	5.96	1.56	22.28	17 33 54.9	0.7
17	.876179	17 17 4.83	17 36 0.2	5.84	1.53	21.91	17 36 16.3	+ 0.6
20	.872139	17 23 4.89	17 45 5.2	5.51	1.46	20.85	17 45 20.5	— 2.1
21	.870948	17 25 18.13	17 48 39.5	5.40	1.43	20.52	17 48 54.6	1.0
22	.869825	17 27 37.65	17 52 26.7	5.29	1.41	20.19	17 52 41.6	0.1
23	.868774	17 30 3.09	17 56 24.8	5.19	1.39	19.87	17 56 39.5	2.7
24	.867789	17 32 34.39	18 0 31.8	5.08	1.37	19.56	18 0 46.3	1.9
25	.866870	17 35 11.26	18 4 45.8	4.98	1.35	19.25	18 5 0.1	3.3
26	.866011	17 37 53.54	18 9 4.7	4.88	1.33	18.95	18 9 18.8	0 6
27	.865213	17 40 41.00	18 13 26.8	4.78	1.31	18.66	18 13 40.7	1.7
28	.864472	17 43 33.46	18 17 50.3	4.69	1.29	18.38	18 18 4.0	— 0.6
Feb. 3	.861125	18 2 23.07	18 43 8.6	4.17	1.18	16.80	18 43 21.2	+ 1.0
5	.860384	18 9 11.84	18 50 31.9	4.02	1.15	16.33	18 50 47.2	+ 1.0
6	.860073	18 12 41.61	18 54 0.7	3.95	1.13	16 10	18 54 12.8	— 0.4
7	.859807	18 16 14.80	18 57 13.2	3.88	1.12	15.88	18 57 25.2	+ 1.9
10	.859218	18 27 13.57	— 19 5 20.2	+ 3.69	1.07	15.46	— 19 5 32.0	+ 3.6

VENUS I.

Computation for Washington Equatorial observations.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax. α.	Parallax. δ.	Semi-diameter. α.	Semi-diameter. δ.	Obs. part.	Comp'd δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	s.	″	s.	″		° ′ ″	
1850.—Oct. 19	.261184	16 40 8.67	— 26 31 55.5	— 0.69	—11.63	1.01	15.21	C.	— 26 32 7.1	
21	.262813	16 47 46.32	26 50 13.9	0.70	12.04	1.04	15.63	C.	26 50 25.9	{ — 1.5 — 3.8
22	.248186	16 51 27.67	26 58 24.9	0.67	12.47	1.06	15.84	C.	26 58 37.4	+ 3.7
28	.248522	17 12 56.49	27 36 47.3	0.75	13.56	1.15	17.25	C.	27 37 0.9	4.4
Nov. 1	.241499	17 26 3.29	27 51 33.0	0.77	14.56	1.22	18.31	C.	27 51 47.6	4.0
2	.238227	17 29 7.99	27 53 55.7	0.77	14.87	1.24	18.59	C.	27 54 10.6	3.7
9	.234576	17 48 24.84	27 56 28.1	0.87	16.54	1.38	20.74	C.	27 56 44.7	3.1
10	.236150	17 50 45.92	27 54 52.1	0.90	16.71	1.41	21.10	C.	27 55 8.9	2.5
	.220761	17 50 43.80	27 54 53.6	0.81	17.22	1.41	21.10	C.	27 55 10.8	0.2
13	.231252	17 57 4.96	27 47 13.7	0.94	17.62	1.48	22.17	C.	27 47 31.3	3.6
14	.225873	17 58 55.62	27 43 45.9	0.93	18.02	1.50	22.54	C.	27 44 3.9	+ 1.8
21	.218820	18 7 49.78	27 6 33.4	— 1.08	19.94	1.69	25.31	C.	27 6 53.3	— 0.1
1851.—Jan. 13	.777047	17 10 37.51	17 28 59.9	+ 1.12	17.70	1.56	23.47	C.	17 29 17.6	8.2
15	.759202	17 13 28 78	17 31 27.9	0.93	16.78	1.51	22.70	C.	17 31 44.7	4.2
24	.753286	17 32 16.76	— 18 0 3.2	+ 0.78	—14.65	1.31	19.60	C.	— 18 0 17.8	— 3.9

VENUS I.

Computation for Greenwich Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular. α.	Tabular. δ.	Parallax.	Comp'd δ.	$\Delta\,\delta$.
		h. m. s.	° ′ ″	″	° ′ ″	″
1850.—(Oct. 15)	.902636	16 23 5.15	— 25 44 25.6	— 13.83	— 25 44 39.43	+ 3.63
(16)	.902303	16 27 3.02	25 56 15.0	14.02	25 56 29.02	4.36
(21)	.902403	16 46 24.46	26 47 5.5	15.03	26 47 20.53	8.70
(Nov. 11)	.890659	17 52 14.35	27 53 33.5	20.69	27 53 54.19	3.81
(28)	.855710	18 8 46.50	26 10 11.7	27.08	26 10 38.78	7.12
(29)	.852608	18 8 14.07	25 59 53.2	27.46	26 0 20.66	8.30
Dec. (6)	.827501	17 59 34.46	24 33 53.5	29.78	24 34 23.28	6.81
27	.733575	17 10 41.75	18 54 48.3	28.25	18 55 16.55	10.10
1 1.—Jan. 8	.697416	17 5 48.51	17 32 24.1	23.51	17 32 47.61	0.44
17	.680398	17 16 43.47	17 35 30.6	20.25	17 35 50.85	+ 1.47
22	.673973	17 27 9.77	17 51 41.2	18.69	17 51 59.89	— 0.55
29	.667855	17 45 55.58	18 21 21.8	16.80	18 21 38.60	0.70
Feb. 2	.665589	17 58 25.84	18 38 22.9	15.86	18 38 38.76	2.36
3	.665146	18 1 43.80	18 42 22.6	15.65	18 42 38.25	2.52
5	.664386	18 8 31.12	18 49 53.1	15.21	18 50 8.31	2.63
7	.663789	18 15 32.74	18 56 36.5	14.80	18 56 51.30	1.40
16	.662845	18 49 40.37	— 19 13 10.6	— 13.16	— 19 13 23.76	— 4.62

VENUS I.

Computation for Altona Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular. α.	Tabular. δ.	Parallax.	Comp'd δ.	$\Delta\,\delta$.
		h. m. s.	° ′ ″	″	° ′ ″	″
1851.—Jan. 27	.641376	17 40 3.06	— 18 12 28.0	+ 17.54	— 18 12 10.5	— 0.1
31	.639051	17 51 56.90	— 18 29 55.0	+ 16.53	— 18 29 38.5	— 2.4

IV. SECOND CONJUNCTION OF VENUS.

VENUS II.

Computation for Santiago Equatorial Observations.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax. α.	Parallax. δ.	Semidiameter.	Obs'd part.	Comp'd δ.	$\Delta\,\delta$.
		h. m. s.	° ′ ″	s.	″	″		° ′ ″	″
1852.—May 30	.257754	7 43 10.58	+24 5 19.4	—0.73	+10.82		C.	+24 5 30.2	—4.5
June 2	.247087	7 52 36.54	23 29 58.7	0.73	11.48		C.	23 30 10.2	+1.5
3	.246930	7 55 36.45	23 17 36.9	0.74	11.62		C.	23 17 48.5	
12	.245048	8 18 33.12	21 17 36.4	0.86	12.94		C.	21 17 49.3	—2.6
15	.244243	8 24 20.30	20 35 35.2	0.92	13.41		C.	20 35 48.6	—1.4
22	.243103	8 33 35.14	18 58 8.9	1.07	14.48		C.	18 58 23.4	+0.2
23	.248384	8 34 21.97	18 44 32.7	1.12	14.46		C.	18 44 47.2	—1.6
24	.245630	8 34 59.60	18 31 13.0	1.14	14.69		C.	18 31 27.7	0.5
July 6	.236984	8 30 12.03	16 11 39.7	1.45	16.30	27.07	N.	16 12 23.1	2.0
9	.231435	8 25 25.78	15 45 2.7	—1.52	16.62	28.03	N.	15 45 47.3	—1.3
30	.745462	7 34 31.34	14 36 25.3	+1.52	16.97		C.	14 36 42.3	+6.7
31	.745779	7 32 45.68	14 37 58.2	1.49	16.96		C.	14 38 15.2	4.6
Aug. 4	.733518	7 27 16.46	14 46 57.9	1.41	16.29		C.	14 47 14.2	8.7
8	.718202	7 24 24.30	14 59 20.0	1.35	15.37		C.	14 59 35.4	5.7
12	.724735	7 24 10.81	15 13 35.5	1.21	15.04		C.	15 13 50.5	8.2
13	.725259	7 24 31.55	15 17 15.2	1.18	14.91		C.	15 17 30.1	7.7
16	.718912	7 26 28.08	15 28 3.9	1.12	14.27		C.	15 28 18.2	5.1
21	.692311	7 32 28.40	15 44 13.5	1.10	12.77		C.	15 44 26.3	5.3
	.714374	7 32 30.41	15 44 17.3	1.02	13.35		C.	15 44 30.6	5.4
22	.707331	7 34 5.31	15 47 3.4	1.03	13.01		C.	15 47 16.4	6.7
23	.714628	7 35 48.70	15 49 39.6	0.98	13.03		C.	15 49 52.7	6.6
28	.716423	7 46 1.79	15 58 56.2	0.87	12.27		C.	15 59 8.5	3.1
Sept. 1	.710386	7 55 56.66	16 0 58.9	0.83	11.53		C.	16 1 10.4	5.7
2	.704420	7 58 37.51	16 0 37.8	0.84	11.25		C.	16 0 49.0	7.2
3	.705168	8 1 24.20	15 59 54.2	0.82	11.12		C.	16 0 5.3	12.3
6	.701033	8 10 9.70	15 55 22.9	0.79	10.62		C.	15 55 33.6	6.5
7	.696216	8 13 12.50	15 53 4.2	0.79	10.39		C.	15 53 14.6	7.8
8	.698248	8 16 20 35	+15 50 19.2	+0.77	+10.29		C.	+15 50 29.5	+2.6

VENUS II.

Computation for Santiago Meridian Observations.

Date.	Wash. M.T. in dec. of day.	Tabular. α.	Tabular. δ.	Parallax.	Semi-diameter. α.	Semi-diameter. δ.	Comp'd δ.	Δδ.
		h. m. s.	° ′ ″	″	s.	″	° ′ ″	″
1852.—May 30	.113124	7 42 41.87	+24 6 57.7	+ 12.80	1.12	15.37	+24 6 55.1	— 4.6
31	.112641	7 45 56.47	23 55 28.5	12.95	1.14	15.59	23 55 25.9	1.9
June 2	.111511	7 52 11.79	23 31 38.1	13.27	1.16	16.04	23 32 7.5	4.8
3	.110860	7 55 12.25	23 19 18.7	13.43	1.18	16.28	23 19 15.8	5 8
12	.102235	8 18 13.95	21 19 35.7	15.03	1.33	18.65	21 20 9.4	2.7
13	.100933	8 20 17.51	21 5 39.5	15.22	1.35	18.95	21 5 35.8	3.2
22	.085462	8 33 27.00	19 0 17.7	17.12	1.54	21.90	19 0 56.7	1.1
23	.083287	8 34 7.56	18 46 46.1	17.34	1.57	22.26	18 46 41.2	4.7
24	.081007	8 34 54.00	18 33 24.3	17.57	1.59	22.62	18 34 4.5	— 1.8
28	.070838	8 35 59.16	17 42 1.1	18.50	1.68	24.10	17 42 43.7	+ 0.5
29	.068019	8 35 51.82	17 29 47.8	18.74	1.71	24.47	17 29 42.1	— 6.0
30	.065091	8 35 34.78	17 17 52.1	18.96	1.73	24.85	17 18 36.0	1.3
July 1	.062049	8 35 7.96	17 6 15.0	19.19	1.76	25.21	17 6 59.4	— 0.7
5	.048760	8 31 42.92	16 23 17.0	20.08	1.85	26.67	16 24 3.7	+ 1.4
6	.045159	8 30 27.60	16 13 29.9	20.30	1.87	27.00	16 14 17.2	3.2
7	.041453	8 29 3.01	16 4 7.7	20.50	1.90	27.34	16 4 55.5	2.7
8	.037642	8 27 29.39	15 55 11.1	20.69	1.92	27.66	15 55 59.4	6.6
9	.033729	8 25 47.09	15 46 40.9	20.88	1.94	27.97	15 47 29.7	7.9
10	.029710	8 23 56.50	15 38 37.5	21.04	1.96	28.26	15 39 26.8	2.7
13	.017183	8 17 39.74	15 17 14.1	21.49	2.00	29.00	15 18 4.6	2.5
18	.993613	8 5 21.09	14 51 8.7	21.91	2.05	29.77	14 52 0.4	5.3
26	.954580	7 42 23.71	14 33 41.3	21.45	2.02	29.28	14 34 32.0	5.7
29	.941985	7 36 2.33	14 35 24.8	20.98	1.97	28.62	14 36 14.4	8.5
30	.937965	7 34 10.34	14 36 41.7	20.79	1.95	28.37	14 37 30.9	11.2
31	.934040	7 32 26.81	14 38 17.8	20.59	1.93	28.08	14 39 6.5	4.3
Aug. 4	.919400	7 29 4.87	14 47 28.7	19.72	1.85	26.82	14 48 15.2	7.3
5	.916023	7 26 8.68	14 50 21.1	19.48	1.82	26.48	14 51 7.1	6.1
6	.912761	7 25 22.47	14 53 24.6	19.24	1.80	26.13	14 54 10.0	7.4
7	.909611	7 24 46.29	14 56 37.5	18 99	1.78	25.77	14 57 22.3	9.5
8	.906579	7 24 20.12	14 59 58.5	18.74	1.75	25.41	15 0 42.6	7.6
10	.900855	7 23 57.50	15 6 58.5	18.24	1.70	24.68	15 7 41.4	9.5
12	.895583	7 24 13.69	15 14 13.0	17.73	1.65	23.96	15 14 54.7	7.5
13	.893109	7 24 35.95	15 17 52.0	17.49	1.63	23.60	15 18 33.1	5.6
14	.890740	7 25 7.39	15 21 30.4	17.24	1.60	23.24	15 22 10.9	6.5
16	.886313	7 26 36.92	15 28 39.1	16.75	1.56	22.54	15 29 18.4	8.7
21	.876917	7 32 45.44	15 44 45.2	15.58	1.44	20.85	15 45 21.6	6.5
22	.875300	7 34 22.07	15 47 30.3	15.33	1.42	20.53	15 48 6.2	5.8
23	.873760	7 36 5.78	15 50 3.1	15.10	1.40	20.21	15 50 38.4	7.7
28	.867234	7 46 22.66	15 59 6.5	14.02	1.30	18.73	15 59 39.2	7.1
31	.864132	7 53 45.58	16 1 0.1	13.42	1.24	17.91	16 1 31.4	6.4
Sept. 1	.863220	7 56 21.08	16 0 57.1	13 22	1.22	17.65	16 1 28.0	7.3
2	.862364	7 59 3.51	16 0 32.4	13.03	1.20	17.39	16 1 2.8	4.5
3	.861563	8 1 50.66	15 59 45.3	12.85	1.19	17.14	16 0 15.3	5.4
6	.859464	8 10 38.57	15 55 2.5	12.30	1.14	16.49	15 55 31.3	7.4
7	.858860	8 13 42.74	15 52 39.2	12.12	1.12	16.21	15 53 7.5	7.6
8	.858300	8 16 50.70	+15 49 50.5	+ 11.94	1.11	15.99	+15 50 18.4	+ 6.3

VENUS II.

Computation for Washington Equatorial observations.

Date.	Wash. M.T. in dec. of day.	Tab. α.	Tab. δ.	Parallax.		Semi-diameter.		Obs. part.	Comp'd δ.	$\Delta\ \delta$.
				α.	δ.	α.	δ.			
	d.	h. m. s.	° ′ ″	s.	″		″		° ′ ″	″
1852.—May 31	.342197	7 46 40.52	+ 23 52 47.8	— 0.85	— 7.67	1.04	15.65	C.	+ 23 52 40.1	— 1.4
June 5	.347380	8 1 37.88	22 50 52.4	0.92	8.64	1.12	16.82	C.	22 50 43.8	1.9
9	.347612	8 12 0.17	21 57 34.7	0.97	9.39	1.19	17.87	C.	21 57 25.3	— 1.4
11	.386008	8 16 41.33	21 29 32.6	— 1.01	11.11	1.23	18.44	C.	21 29 21.5	
Aug. 26	.656998	7 41 30.31	15 55 55.5	+ 1.03	11.02	1.29	19.36	C.	15 55 44.5	
29	.656827	7 48 14.05	+ 15 59 53.5	+ 0.98	—10.44	1.23	18.51	C.	+ 15 59 43.1	+ 7.4

VENUS II.

Computation for Greenwich Meridian observations.

Date.	Wash. M.T. in dec. of day.	Tabular.		Parallax.	Comp'd δ.	$\Delta\ \delta$.
		α.	δ.			
		h. m. s.	° ′ ″	″	° ′ ″	″
1852.—(May 24)	.919003	7 21 2.33	+ 25 10 32.1	— 6.15	+ 25 10 25.95	— 4.20
(July 3)	.860244	8 33 54.77	16 46 8.9	14.48	16 45 54.42	— 2.44
(5)	.853424	8 31 56.57	16 25 15.0	15.01	16 24 59.99	+ 0.51
(6)	.849844	8 30 43.11	16 15 23.1	15.27	16 15 7.83	— 1.48
(7)	.846159	8 29 20.32	16 5 55.9	15.52	16 5 40.38	— 0.43
(8)	.842367	8 27 48.44	15 56 54.2	15.76	15 56 38.41	+ 0.28
(12)	.826235	8 20 17.47	15 25 15.4	16.62	15 24 58.78	— 0.08
(13)	.821994	8 18 6.22	15 18 30.3	16.80	15 18 13.50	+ 1.34
(16)	.808856	8 10 58.01	15 1 6.9	17.25	15 0 49.65	1.35
22	.777107	7 52 43.02	14 37 18.4	17.58	14 37 0.82	3.02
Aug. 4	.724006	7 27 17.05	14 46 56.4	15.79	14 46 40.61	5.32
12	.700009	7 24 10.42	15 13 30.0	13.97	15 13 16.03	6.98
24	.676523	7 37 34.14	15 51 56.4	11.42	15 51 44.98	7.01
30	.669224	7 50 41.95	16 0 36.1	10.40	16 0 25.70	5.95
Sept. 1	.667327	7 55 49.80	16 0 59.3	10.09	16 0 49.21	5.93
2	.666464	7 58 31.28	16 0 39.0	9.95	16 0 29.05	6.27
13	.660091	8 32 41.41	+ 15 30 12.5	— 8.66	+ 15 30 3.84	+ 6.18

VENUS II.

Computation for Cracow Meridian Observations.

Date.	Washington M.T. in dec. of day.	Tabular α.	Tabular δ.	Parallax.	Comp'd δ.	$\Delta\delta$.
		h. m. s.	° ′ ″	″	° ′ ″	″
1852.—June 2	.860169	7 51 25.64	+ 23 34 41.7	+ 6.99	+ 23 34 48.7	+ 2.0
3	.859535	7 54 27.33	23 22 26.1	7.15	23 22 33.3	— 1.2
4	.858841	7 57 24.08	23 9 55.6	7.30	23 10 2.9	3.2
5	.858096	8 0 15.73	22 57 11.4	7.47	22 57 18.9	6.4
7	.856414	8 5 43.15	22 31 5.4	7.81	22 31 13.2	1.2
8	.855476	8 8 18.62	22 17 46.1	7.99	22 17 54.1	— 0.4
11	.852266	8 15 30.14	21 36 55.6	8.55	21 37 4.2	+ 0.2
12	.851051	8 17 41.79	21 23 5.4	8.75	21 23 14.2	+ 1.5
14	.848404	8 21 45.71	20 55 11.4	9.17	20 55 20.6	— 5.5
17	.843838	8 27 0.27	20 13 5.9	9.83	20 13.15.7	+ 5.2
18	.842153	8 28 30.60	19 59 5.3	10.06	19 59 15.4	— 2.7
23	.832345	8.34 3.66	18 50 9.3	11.29	18 50 20.6	0.1
26	.825272	8 35 40.79	18 10 29.8	12.07	18 10 41.9	— 1.7
27	.822707	8 35 54.86	17 57 41.5	12.34	17 57 53.8	+ 6.4
Aug. 17	.633265	7 27 19.27	15 31 15.4	12.41	15 31 27.8	13.6
18	.631268	7 28 23.13	+ 15 34 38.9	+ 12.20	+ 15 34 51.1	+ 6.3

§8. SOLAR PARALLAX FROM CORRESPONDENT OBSERVATIONS.

The fewness and insufficiency of the correspondent observations have already been shown and commented upon. It is nevertheless proper to deduce such resultant values as they afford, and this the preceding computations now enable us readily to do.

The comparisons in these cases having been made with the same star and nearly at the same time, the corrections of the ephemeris and of the semidiameter may be regarded as constant for the interval which may have elapsed between the northern and the southern observation. The paucity of material renders any attempts to eliminate the influence of irradiation or of personal equation altogether futile, and the formula thus assumes a very simple shape.

The comparison of the planet with a fixed star gives the equation—

$$\delta - d = \delta_0 - d + (\Delta\delta_0) \pm r - k\varpi + \mu\Delta m \pm \left(\frac{1}{\Delta}\,\delta\varrho + i + q\right)$$

$$\text{or}\quad Dm = \delta_0 - d + (\Delta\delta_0) \pm r + p_0 - k\delta\varpi + c$$

in which the notation of § 3 is retained, p_0 being substitued for $k\,\varpi_0$, the parallax as computed with the adopted Enckian value.

The results of the correspondent observations thus computed are appended, and arranged in a form which will explain itself. The northern observations are first given, then the southern ones, and lastly, the values deduced from the combination of the two, together with the determination of ϖ from the equation

$$S = (k_2 - k_1)\,\delta\varpi = 2\delta D_t\delta - (\Delta m_2 - \Delta m_1) \pm (r_2 - r_1) + (p_2 - p_1)$$

I. *Correspondent Observations in Northern Latitudes.*

A. MARS I.

Place.	Date.	Time.	Wash. M.T. t_1	Dm_1	r_1	p_1	k_1
	1849.	h. m. s.		″		″	″
Washington	Dec. 12	4 32 6.82	.461928	− 67.49	—	− 3.47	− 0.405
"	12	4 32 6.82	.461928	− 67.49	—	3.47	0.405
Greenwich	15	5 18 15	.272244	−131.81	—	6.22	0.725
Washington	17	4 27 37.13	.445164	+ 36.33	—	3.39	0.395
Cambridge	17	2 10 4.80	.333503	+ 34.68	+ 7.98	5.93	0.692
Washington	27	3 58 25.54	.397642	− 26.82	—	3.34	0.390
Greenwich	27	0 51 10	.054511	− 24.11	—	8.45	0.986
Cambridge	27	2 43 36.12	.329415	− 18.42	+ 7.69	5.06	0.591
Washington	31	4 10 43.34	.395237	+ 80.66	—	3.14	0.366
Cambridge	31	6 4 1.98	.457302	+ 71.05	− 7.50	3.80	0.443
	1850.						
Cambridge	Jan. 1	1 53 41.4	.281197	+ 33.25	− 7.45	5.44	0.623
Greenwich	4	4 20 15.5	.177475	− 46.24	—	5.74	0.670
Cambridge	4	1 46 58.82	.268358	− 46.07	+ 7.29	5.36	0.625
Greenwich	7	3 23 46	.130159	−219.40	—	5.92	0.690
Washington	9	3 57 3.80	.361203	−355.73	—	2.98	0.348
"	12	3 40 57.14	.341853	+ 82.67	—	3.01	0.351
"	14	4 29 52.31	.370271	− 45.30	—	2.71	0.315
"	22	4 15 28.06	.338453	+144.67	—	2.57	0.300
"	29	3 16 54.06	.275307	−110.86	—	− 2.73	− 0.318

B. MARS II

Place.	Date.	Time.	Wash. M.T. t_1	Dm_1	r_1	p_1	k_1
	1852.	h. m. s.		″		″	″
Washington	Jan. 24	6 25 40.24	.424491	−445.63	—	− 3.94	− 0.460
"	Feb. 2	6 36 51.43	.407664	+ 20.73	—	− 3.52	− 0.411

C. VENUS I.

Place.	Date.	Time.	Wash. M.T. t_1	Dm_1	r_1	p_1	k_1
	1850.	h. m. s.		″		″	″
Washington	Oct. 19	20 8 23.71	.261184	−265.64	—	− 11.63	− 1.357
"	22	20 1 25.02	.248186	+154.65	—	12.47	1.455
"	Nov. 1	20 31 13.19	.241499	+301.54	—	14.56	1.699
"	2	20 30 26.21	.238227	+158.93	—	14.87	1.735
"	10	20 58 58.72	.236150	−197.92	—	16 71	1.950
"	13	21 3 43.99	.231252	+149.58	—	17.62	2.056
"	14	20 59 54.68	.225873	+ 50.76	—	18.02	2.102
"	21	21 17 19.48	.218820	− 92.46	—	19.94	2.327
"	1851.						
	Jan. 15	13 54 26.81	.759202	+ 81.70	—	− 16.78	− 1.958

II. *Correspondent Observations in Southern Latitudes.*

A. MARS I.

Place.	Date.	Time.	Wash. M.T. t_2	Dm_2	r_2	p_2	k_2
	1849.	h. m. s.		"		"	"
Santiago	Dec. 12	3 45 40.36	.411837	— 55.21	—	+ 11.90	+ 1.388
"	12	4 33 52.53	.445221	48.09	—	12.40	1.446
"	15	4 3 20.25	.415880	—102.30	—	12.14	1.417
"	17	5 6 31.16	.454176	+ 53.11	—	12.58	1.468
"	27	5 24 41.28	.439454	— 11.12	—	12.18	1.421
"	31	4 55 12.18	.408113	+ 98.89	—	11.85	1.383
	1850.						
"	Jan. 1	4 51 23.94	.402747	+ 54.37	—	11.77	1.373
"	4	5 11 25.58	.408426	— 44.91	—	11.55	1.347
"	7	5 6 42.04	.396962	221.93	—	11.27	1.315
"	9	5 6 23.99	.391292	—347.62	—	11.08	1.293
"	12	5 10 26.38	.385899	+ 94.50	—	10.79	1.259
"	14	5 20 13.40	.387213	— 33.01	—	10.58	1.235
"	22	5 26 8.50	.369468	+157.41	—	9.78	1.138
"	29	5 24 30.34	.349222	— 99.13	—	+ 9.11	+ 1.063

B. MARS II.

Place.	Date.	Time.	Wash. M.T. t_2	Dm_2	r_2	p_2	k_2
	1852.	h. m. s.		"		"	"
Santiago	Jan. 24	8 2 48.04	.473829	—415.06 } —415.48 }	—	+ 9.17	+ 1.263
"	Feb. 2	8 6 34.80	.451873	+ 46.58	—	+ 10.71	+ 1.250

C. VENUS I.

Place.	Date.	Time.	Wash. M.T. t_2	Dm_2	r_2	p_2	k_2
	1850.	h. m. s.		"	"	"	"
Santiago	Oct. 19	22 25 50.70	.338449	—236.83	+15.23	+ 7.03	+ 0.820
"	22	22 21 4.80	.326958	+152.67	15.86	6.87	0.685
"	Nov. 1	22 41 8.48	.313547	333.59	18.33	7.40	0.863
"	2	22 59 11.28	.323315	+192.42	18.61	7.97	0.930
"	10	22 28 27.40	.280189	—145.35	21.13	7.24	0.845
"	13	23 29 15.60	.314107	+218.67	22.20	9.15	1.067
"	14	23 34 40.74	.315130	+121.84	22.57	9.91	1.156
"	21	23 28 8.62	.291491	— 6.96	+25.34	10.58	1.235
	1851.						
"	Jan. 15	11 55 21.72	.658800	+ 97.80	—22.74	+ 10.72	+ 1.251

III. *Parallax deduced from Correspondent Observations.*

1. WASHINGTON AND SANTIAGO.

Obs.	Date.	$t.$	$2\,\vartheta.$	$D_t\delta.$	$2\,\vartheta\,D_t\delta.$	$Dm_1 - Dm_2.$	$r_2 - r_1$	$p_2 - p_1$	$S.$	$k_2 - k_1$	$\delta\varpi.$
	1849.		d.	″	″	″		″	″	″	″
Mars I	Dec. 12	.436883	—0.050091	+113.3	— 5.68	—12.28	—	+15.37	— 2.59	+1.793	+1.445
	12	.453575	—0.016707	+113.1	— 1.89	—19.40	—	+15.87	— 5.42	+1.851	+2.928
	17	.449670	+0.009012	+ 66.2	+ 0.60	—16.78	—	+15.97	— 0.21	+1.863	+0.113
	27	.418548	+0.041812	— 17.2	— 0.72	—15.70	—	+15.52	— 0.90	+1.811	+0.497
	31	.401675	+0.012876	— 39.9	— 0.51	—18.23	—	+14.99	— 3.75	+1.749	+2.444
	1850.										
	Jan. 9	.376248	+0.030089	— 63.5	— 1.91	— 8.11	—	+14.06	+ 4.04	+1.641	—2.462
	12	.363876	+0.044046	— 64.2	— 2.83	—11.83	—	+13.80	— 0.86	+1.610	+0.534
	14	.378742	+0.016942	— 62.5	— 1.06	—12.29	—	+13.29	+ 0.04	+1.550	—0.026
	22	.353961	+0.031015	— 46.1	— 1.43	—12.74	—	+12.35	— 1.82	+1.438	+1.266
	29	.312265	+0.073915	— 27.4	— 2.03	—11.73	—	+11.84	— 1.92	+1.381	+1.390
	1852.										
Mars II	Jan. 24	.449160	+0.049338	+370.7	+18.29	—30.57 } —30.15 }	—	+13.11	+ 0.83 } + 1.25 }	+1.723	—0.482
	Feb. 2	.429769	+0.044209	+253.5	+11.21	—25 85	—	+14.23	— 0.41	+1.661	+0.247
	1850.						″				
Venus I	Oct. 19	.299817	+0.077265	—580.4	—44.84	—28.81	+15.23	+18.66	—39.76	+2.177	+18.264
	22	.287572	+0.078772	—481.3	—37.91	+ 1.98	+15.86	+19.34	— 0.73	—2.140	+0.341
	Nov. 1	.277523	+0.072048	—157.6	—11.35	—32.05	+18.33	+21.96	— 3.11	+2.562	+1.214
	2	.280771	+0.085088	—126.4	—10.76	—33.49	+18.61	+22.84	— 2.80	+2.665	+1.051
	10	.258170	+0.044039	+111.1	+ 4.89	—52.57	+21.13	+23.95	— 2.60	+2.795	+0.930
	13	.272680	+0.082855	+196.2	+16.26	—69.09	+22.20	+26.77	— 3.86	+3.123	+1.236
	14	.270502	+0.089257	+223.9	+19.98	—71.08	+22.57	+27.93	— 0.60	+3.258	+0.184
	21	.255156	+0.072671	+416.8	+30.29	—85.50	+25.34	+30.52	+ 0.65	+3.562	—0.182
	1851.										
	Jan. 15	.709001	—0.100402	—100.9	+10.13	—16.10	—22.74	+27.50	— 1.21	+3.209	+0.377

2. CAMBRIDGE AND SANTIAGO.

Obs.	Date.	$t.$	$2\,\vartheta.$	$D_t\delta.$	$2\,\vartheta\,D_t\delta.$	$Dm_1 - Dm_2$	$r_2 - r_1$	$p_2 - p_1$	$S.$	$k_2 - k_1$	$\delta\varpi.$
			d.	″	″	″	″	″	″	″	″
Mars I	Dec. 17	.393840	+0.120673	+ 66.7	+ 8.05	—18.43	—7.98	+18.51	+0.15	+2.160	—0.069
	27	.384435	+0.110039	— 17.0	— 1.87	— 7.30	—7.69	+17.24	+0.38	+2.012	—0.189
	31	.432708	—0.049189	— 40.1	+ 1.97	—27.84	+7.50	+15.65	—2.72	+1.826	+0.148
	Jan. 1	.341972	+0.121550	— 44.2	— 5.37	—21.12	+7.45	+17.21	—1.83	+1.996	+0.917
	4	.338392	+0.140068	— 55.1	— 7.72	— 1.16	—7.29	+16.91	+0 74	+1.972	—0.375

3. GREENWICH AND SANTIAGO.

Obs.	Date.	$t.$	$2\,\vartheta.$	$D_t\delta.$	$2\,\vartheta\,D_t\delta.$	$Dm_1 - Dm_2$	$r_2 - r_1$	$p_2 - p_1$	$S.$	$k_2 - k_1$	$\delta\varpi.$
			d.	″	″	″		″	″	″	″
Mars I	Dec. 15	.344062	+0.143640	+ 86.2	+12.38	—29.51	—	+18.36	+1.23	+2.142	—0.574
	27	.246983	+0.384943	— 16.1	— 6.20	—12.99	—	+20.63	+1.44	+2.407	—0.598
	Jan. 4	.292951	+0.231951	— 55.0	—12.76	— 1.33	—	+17.29	+3.20	+2.017	—1.587
	7	.263561	+0.266803	— 61.6	—16.44	+ 2.53	—	+17.19	+3.28	+2.005	—1.636

§ 9. EQUATIONS OF CONDITION.

We have now the means of forming our equations of condition for each series, as proposed in § 3; and the coefficients of the unknown quantities in each equation of the several sets, being computed as there described and arranged in tabular form, are given in the present section; the equations being numbered for convenience of reference to the observations from which they are respectively derived. The values of a and d being always unity, it is of course unnecessary to include them in the tables, for no confusion or embarrassment can arise on account of their signs, inasmuch as a is always positive, and d has the same sign as e. The quantity s denotes, as usual, the sum of all the coefficients, and p the weight, computed as hereafter to be explained. The unknown quantity **v**, which is the correction to the adopted value of a revolution of the micrometer-screw, has only been introduced in the equations derived from observations at Santiago and the Cape,—these being the only ones, excepting the Washington series, in which the number of comparisons and fullness of detail render the determination practicable with sufficient accuracy. At Washington, there were a number of declination-threads upon the diaphragm carried by the micrometer-screw, so that the interval actually traversed in measuring a difference of declination was in every case small.

To the groups of equations of condition, as given by the comparison of each observation with the place of the planet derived from computation, are to be added still other series resulting from the comparison of the measurements of the respective limbs, and capable of serving to some extent as aids toward freeing our equations from the influence of the two unknown quantities which affect the apparent diameters. These unknown quantities, which have been denoted by the letters **t** and **u**, measure, respectively, the error of the normal semidiameter added to such irradiation as may be inversely proportional to the distance, and that portion of the irradiation which is peculiar to the observer and the instrument, with which last is inseparably merged the personal equation of a limb-pointing and any error in the assumed thickness of the threads.

Each measurement of a diameter furnishes an equation containing these two unknown quantities **t** and **u**; and, in addition to the direct measurements, each of those observations, which consist of comparisons of the limbs of the planet, affords a measurement of the diameter. We thus obtain a large number of additional equations which may be directly incorporated with the others. They comprise two classes: the one consisting of direct measurements of diameters, for which the differential refraction is utterly insensible; and the other, which includes the great majority of cases, being affected by the motion of the planet during the interval, often very considerable, between the means of these pointings for the different limbs, and also by the change of the refraction during the same interval.

To the regular equations of condition are appended these additional ones, arranged like the others in tabular form, the two classes being separately given.

To form the equations of condition for these last mentioned cases, let us retain the former notation,* affixing one or two accents to the symbols, according as they refer to the first or second observation.

For the first observed limb, we shall then have—

$$0 = \delta_0' \pm \frac{1}{\Delta'}\rho_0 - k'\varpi_0 - \delta' + \mathbf{x} + \mathbf{y}\,(t' - T) + \mathbf{z}\,(t' - T)^2 \pm (i_1 + q) \pm \frac{1}{\Delta'}(\partial\rho + i_0) + \varDelta m'.\mu - k'\partial\varpi$$

and for the second—

$$0 = \delta_0'' \mp \frac{1}{\Delta''}\rho_0 - k''\varpi_0 - \delta'' + \mathbf{x} + \mathbf{y}\,(t'' - T) + \mathbf{z}\,(t'' - T)^2 \mp (i^1 + q) \mp \frac{1}{\Delta''}(\partial\rho + i_0) + \varDelta m''.\mu - k''\partial\varpi$$

* To avoid unnecessary complication, the factors 20 and 1000, which are combined with **y** and **z** in the numerical solution, are here disregarded.

in which equations the signs are respectively correspondent. Thus, if the time t' belong to a comparison or mean of comparisons of the north limb, and the upper sign is consequently to be taken, the upper sign will also hold in the other equation, which will belong to a comparison of the south limb; and so in the reverse case.

The sum and difference of the foregoing equations give, after halving—

$$0 = \tfrac{1}{2}(\delta_o'' + \delta_o') \mp \tfrac{1}{2}\left(\frac{1}{\Delta''} - \frac{1}{\Delta'}\right)\rho_o - (k'' + k')\varpi_o - \tfrac{1}{2}(\delta'' + \delta') + \mathbf{x} + \mathbf{y}\{\tfrac{1}{2}(t'' + t') - T\}$$
$$+ \mathbf{z}\,.\,\tfrac{1}{2}\{(t'' - T)^2 + (t' - T)^2\} \mp \tfrac{1}{2}\left(\frac{1}{\Delta''} - \frac{1}{\Delta'}\right)(\delta\rho + i_o) + \tfrac{1}{2}(\varDelta m'' + \varDelta m')\,\mu - \tfrac{1}{2}(k'' + k')\,\delta\varpi$$

$$0 = \tfrac{1}{2}(\delta_o'' - \delta_o') \mp \tfrac{1}{2}\left(\frac{1}{\Delta''} + \frac{1}{\Delta'}\right)\rho_o - (k'' - k')\varpi_o - \tfrac{1}{2}(\delta'' - \delta') \mp (i_i + q) + \mathbf{y}\,.\,\tfrac{1}{2}(t'' - t')$$
$$+ \mathbf{z}\,.\,\tfrac{1}{2}\{(t'' - T)^2 - (t' - T)^2\} \mp \tfrac{1}{2}\left(\frac{1}{\Delta''} + \frac{1}{\Delta'}\right)(\delta\rho + i_o) + \tfrac{1}{2}(\varDelta m'' - \varDelta m')\,\mu - \tfrac{1}{2}(k'' - k')\,\delta\varpi$$

Let us now, slightly varying the notation of § 3, denote the middle time $\tfrac{1}{2}(t'' + t')$ by $\mathbf{t}$, and the half-interval $\tfrac{1}{2}(t'' - t')$ by τ, and consider the unaccented symbols as pertaining to the instant t. We shall then have,* omitting all terms of the third and higher powers—

$$\delta_o'' = \delta_o + \tau D_t\delta_o + \tfrac{1}{2}\tau^2 D_t^2\delta_o \qquad \delta_o' = \delta_o - \tau D_t\delta_o + \tfrac{1}{2}\tau^2 D_t^2\delta_o$$
$$\frac{1}{\Delta''} = \frac{1}{\Delta} + \tau D_t\frac{1}{\Delta} + \tfrac{1}{2}\tau^2 D_t^2\frac{1}{\Delta} \qquad \frac{1}{\Delta'} = \frac{1}{\Delta} - \tau D_t\frac{1}{\Delta} + \tfrac{1}{2}\tau^2 D_t^2\frac{1}{\Delta}$$
$$k'' = k + \tau D_t k + \tfrac{1}{2}\tau^2 D_t^2 k \qquad k' = k - \tau D_t k + \tfrac{1}{2}\tau^2 D_t^2 k$$
$$\varDelta m'' = (\delta'' - d) = (\delta - d) + \tfrac{1}{2}(\delta'' - \delta') \qquad \varDelta m' = (\delta' - d) = (\delta - d) - \tfrac{1}{2}(\delta'' - d')$$
$$(t'' - T)^2 = (t - T)^2 + 2\tau(t - T) + \tau^2 \qquad (t' - T)^2 = (t - T)^2 - 2\tau(t - T) + \tau^2$$

The substitution of these expressions in the preceding equations gives us—

$$0 = \delta_o - k\varpi_o - \delta + \mathbf{x} + \mathbf{y}\,(t - T) + \mathbf{z}\,(t - T)^2 - \varDelta m.\mu - k\delta\varpi \mp \tau D_t\frac{1}{\Delta}\{\rho_o + (\delta\rho + i_o)\}$$
$$+ \tfrac{1}{2}\tau^2\{D_t^2\delta_o - D_t^2 k.\varpi_o + 2\mathbf{z} - D_t^2 k\delta\varpi\}$$

$$0 = \mp\frac{1}{\Delta}\rho_o - \tfrac{1}{2}(\delta'' - \delta') \pm (i_1 + q) \mp \frac{1}{\Delta}(\delta\rho + i_o) + \tau\{D_t\delta_o - D_t k.\varpi_o + \mathbf{y} + 2\mathbf{z}\,(t - T) - D_t k\delta\varpi\}$$
$$\mp \tfrac{1}{2}\tau^2 D_t^2\frac{1}{\Delta}\{\rho_o + (\delta\rho + i_o)\}$$

in both which formulas the upper sign is to be taken if the north limb was first observed, and the lower sign if the observation of the south limb preceded.

By reason of the smallness of τ, all consideration of many of the terms may be dispensed with. Not only do all the terms of the second order become negligible, but the quantities $\tau\,\mathrm{D}_t\frac{1}{\Delta}\left\{\rho_0 + (\delta\rho + i_0)\right\}$ in the first, and $\tau\,\mathrm{D}_t k.\,\delta\varpi$ in the second equation are likewise inappreciable. And we shall moreover find that $\mathbf{y}$, the daily change of the correction to the tabular declination, as also $\mathbf{z}\,(t - T)$ which is of about the same order, are so small that their products with τ are never sensible

The only terms of the first order remaining in the first equation and containing τ will then be $\tau\,\mathrm{D}_t\frac{1}{\Delta}\rho_o = \tau\,\mathrm{D}_t\frac{\rho_0}{\Delta}$ or the variation of tabular semidiameter during the interval τ. Recurring to the ephemerides, we find the maximum amount of this variation in one day to be

0″.06 for *Mars* I.	0″.43 for *Venus* I.
0 .05 for *Mars* II.	0 .38 for *Venus* II.

* The term $\varDelta m$ is strictly $= \delta - d \pm f_n$, the quantity f_n denoting the distance of the thread used from the standard or zero thread of the movable diaphragm. But this coefficient is only employed in the present discussion, for instruments provided with a single movable thread.

All these "Additional Equations" are numbered like the rest, the same number being prefixed to those equations which are derived from the same observations.

It is thus rendered manifest that the term under consideration could not, even for *Venus* I, amount to so much as 0."01 for $\tau = 33^m$, an interval many times exceeding the largest value of τ.

In the second equation there remain the terms $\tau D_t \delta_0$ and $\tau . D_t k . \varpi_0 = \tau D_t k \varpi_0 = \tau D_t p$, or the variation of the parallax during the interval.

Our equations thus assume the form—

$$0 = \delta_0 - k\varpi_0 - \delta + x + y\,(t - T) + z\,(t - T)^2 + \mu\,\Delta m - k\delta\varpi.$$

$$0 = \pm \left\{ \tfrac{1}{2}(\delta'' - \delta') - \tau D_t \delta_0 + \tau D_t p \right\} + \frac{\rho_0}{\Delta} + (i_1 + q) + \frac{1}{\Delta}(\delta\rho + i_0)$$

the upper sign holding when the north limb is first observed.

Let us now develop the term $D_t p$, the first difference of the parallax in declination for an interval of one day.

We have for the time t,

$$p = \varpi_0 \cdot \frac{1}{\Delta} \cdot \rho \left\{ \sin\varphi' \cos\delta - \cos\varphi' \sin\delta \cos(\theta - \alpha) \right\}$$

and for the time $t \pm 1^h$,

$$p_{\pm 1} = \varpi_0 \cdot \frac{1}{\Delta} \cdot \rho \left\{ \sin\varphi' \cos\delta - \cos\varphi' \sin\delta \cos\,(\theta - \alpha) \cos 15^\circ \pm \cos\varphi' \sin\delta \sin(\theta - \alpha) \sin 15^\circ \right\}$$

The mean of the deduced variations for the hours immediately preceding and following the middle time t gives us the hourly variation corresponding to that instant,

$$\Delta p = \varpi_0 \sin 15^\circ \rho \cos\varphi' \frac{\sin\delta}{\Delta} \sin(\theta - \alpha.)$$

The quantity $\frac{\sin\delta}{\Delta}$ varies between narrow limits during each series of observations, and $\rho\cos\varphi'$ is also not very different for the several places of observation. Substituting, then, in the expression for Δp the maximum value of the compound factor $\rho\cos\varphi' \frac{\sin\delta}{\Delta}$ for each series, we readily obtain closely approximate values for the maximum hourly variations of the parallax in declination. These are thus seen to be

for *Mars* I., $+ 1''.41 \sin(\theta - \alpha)$	for *Venus* I., $- 2''.77 \sin(\theta - \alpha)$
Mars II., $+ 1\ .14 \sin(\theta - \alpha)$	*Venus* II., $+ 1\ .64 \sin(\theta - \alpha)$

This term will consequently be sensible for *Venus*, and in some cases also for *Mars*, although this planet was almost uniformly observed within two hours of the meridian, excepting at Cambridge.

Inasmuch as τ seldom exceeds 3^m, and only once or twice amounts to 5^m, we shall find it convenient to introduce the entire interval $t'' - t' = 2\tau$, and to express it in decades of minutes as units. Then putting $D_t p =$ the variation of the parallax in declination during 10^m, we have,

$$\tfrac{1}{2} D_t p = + \tfrac{1}{2}\varpi_0 \sin 2^\circ.5\ \ \rho\cos\varphi' \frac{\sin\delta}{\Delta} \sin(\theta - \alpha) = \Phi \frac{\sin\delta}{\Delta} \sin(\theta - \alpha),$$

and shall find for the several observations which have contributed extra-meridional observations, the following values of the constant Φ.

Place.	Φ	log. Φ
Santiago	+ 0".156	9.1935
Washington	0 .146	9.1634
Cape of Good Hope . .	0 .155	9.1910
Greenwich	0 .117	9.0669
Cambridge	+ 0 .138	9.1408

and the following maxima of $\Phi \frac{\sin\delta}{\Delta}$ for the Santiago series.

Series.	$\phi \frac{\sin \delta}{\Delta}$	*log.*	*H.*
Mars I.	$+0''.119$	9.076	14°.35
Mars II.	$+0\ .096$	8.981	18 .17
Venus I.	$+0\ .233$	9.368	7 .23
Venus II.	$+0\ .138$	9.140	12 .33

The last column, H, shows the hour-angle at which the maximum value of $\tau\, D_t p$ attains the limit 0.″03.

Denoting similarly by $D_t\delta$ the variation of the planet's declination in 10^m, we may prepare an ephemeris for $\frac{1}{2}\, D_t\, \delta$, and our formulas assume the shape,

$$0 = \left\{ \delta_0 - k\varpi_0 - \delta \right\} + \mathrm{x} + \mathrm{y}\,(t - T) + \mathrm{z}\,(t - T)^2 + \mu\, \varDelta m - k\delta\varpi.$$

$$0 = \pm \left\{ \tfrac{1}{2}\,(\delta'' - \delta') - 2\tau\, \tfrac{1}{2}\, D_t\delta_0 + 2\tau\, \Phi\, \frac{\sin \delta}{\Delta} \sin\,(\theta - a) \right\} + \frac{\rho^o}{\Delta} + (i_1 + q) + \frac{1}{\Delta}(\delta\rho + i_o)$$

in which the upper sign is to be used when the observation of the north limb precedes.

The first term of the second equation will ordinarily be negative, since τ is usually so small that $2\,\tau\,\frac{1}{2}\,\mathrm{D}_t\,\delta$, the planet's motion during the interval, is much less than $\frac{1}{2}\,(\delta''—\delta'.)$ A convenient form of the equation will therefore be—

$$0 = -\tfrac{1}{2}\,(\delta'' - \delta') + \frac{\rho^o}{\Delta} \mp 2\tau .\ \tfrac{1}{2}\, D_t\delta_0 \pm 2\tau .\ \tfrac{1}{2}\, D_t p + (i_1 + q) + \frac{1}{\Delta}\,\delta\varrho + i_o)$$

in which we may avoid all need of attention to the signs of $\delta'' - \delta'$ and $\frac{\rho_o}{\Delta}$; and use, as before, the upper sign when the north limb has been first observed.

The correction for defective illumination has, for simplicity's sake, not been introduced into these formulas. When appreciable, it is to be applied with reversed sign to the value of the computed apparent semidiameter $\frac{\rho_o}{\Delta}$, with which our formula assumes it to be merged.

We have now the equations of condition, represented like those of § 3.

$$0 = n + a.\mathbf{x} + b.\mathbf{y} + c.\mathbf{z} + f.\mathbf{v} + g.\mathbf{w}.$$
$$0 = n + d.\ \mathbf{t} + e.\ .$$

n representing in each equation the numerical value (c — o.)

The equations derived from direct measurements of diameters are obtained in the same form, simply by making $t = o$; so that for these cases,

$$0 = -\tfrac{1}{2}\,(\delta'' - \delta') + \frac{\rho_o}{\Delta} + (i_, + q) + \frac{1}{\Delta}\,(\delta\varrho + i_o)$$
$$0 = n + d.\mathbf{t} + e.\mathbf{u}.$$

The "Additional Equations" of condition, derived from the differences of limb-measurements, are given for each series and each observatory, and immediately follow the regular equations, from which the quantities depending upon the apparent diameter have been entirely or chiefly eliminated. They are arranged in the form of tables, which likewise contain the principal auxiliary quantities employed in the formation of the coefficients. It will be borne in mind that the declinations δ' and δ'' are supposed to be already corrected for refraction, and the tabular apparent semidiameter to be corrected for defect of illumination. The quantity $D_t p$ is taken into account in the computation of n. Those equations deduced from direct measurement of diameter are given by themselves.

FORMATION OF EQUATIONS OF CONDITION.

MARS I.

Equatorial, Santiago.

(BOTH LIMBS OBSERVED THROUGHOUT.)

Nᵒ.	Date.	log. b.	log. c.	log. f.	log. g.	log. s.	log. n.	k^2.	s.	p.
1	1849.—Dec. 10	n0.01040	9.62286	n9.17493	0.17090	0.23754	0.5051	2.197	+ 1.7280	4.53
2	11	n9.99061	9.58328	n0.23586	0.15382	9.03423	0.7634	2.031	0.1082	2.89
3		n9.98979	9.58164	n0.22212	0.16560	9.30384	0.7993	2.144	0.2013	4.58
4		n9.98880	9.57966	n0.20707	0.17118	9.44342	0.6532	2.200	0.2776	3.76
5	12	n9.96821	9.53848	n9.74147	0.14247	0.09791	0.6628	1.927	1.2529	2.89
6		n9.96743	9.53692	n9.68160	0.16031	0.14070	0.2304	2.092	1.3826	3.62
7	13	n9.94223	9.48652	9.80106	0.17121	0.40601	0.6021	2.200	2.5469	5.07
8	14	n9.91716	9.43638	n0.26951	0.16971	8.81224	0.5563	2.185	0.0649	4.94
9	15	n9.89165	9.38536	n0.00932	0.15125	9.93379	0.5441	2.007	0.8586	4.52
10		n9.88961	9.38128	n9.97322	0.17062	0.00260	0.3802	2.194	1.0060	4.96
11	16	n9.86300	9.32806	n9.34321	0.14996	0.22409	0.4771	1.995	1.6753	5.44
12	17	n9.83077	9.26360	9.72321	0.16675	0.39846	0.5185	2.155	2.5030	5.25
13	18	n9.79827	9.19860	0.05030	0.16080	0.49144	0.5682	2.097	3.1006	4.10
14	20	n9.72318	9.04842	n9.88053	0.15954	0.10295	0.6232	2.085	1.2675	4.33
15		n9.71950	9.04106	n9.84942	0.15726	0.11893	0.3802	2.063	1.3150	3.63
16	21	n9.68050	8.96306	n9.63488	0.15596	0.20774	0.6902	2.051	1.6134	3.22
17	22	n9.63117	8.86440	n9.21511	0.16206	0.28639	0.5798	2.109	1.9337	4.85
18	23	n9.57850	8.75906	7.69897	0.15683	0.32601	0.5911	2.059	2.1184	5.02
19	24	n9.51643	8.63492	8.92117	0.15757	0.34938	0.5315	2.066	2.2355	5.20
20	25	n9.44491	8.49188	8.96848	0.15573	0.35730	0.4914	2.049	2.2767	5.25
21	26	n9.35892	8.31990	8.37840	0.15414	0.35072	0.4314	2.034	2.2424	5.39
22	27	n9.25048	8.10302	n9.04454	0.15256	0.33139	0.3617	2.019	2.1448	5.18
23	30	n8.47647	6.55500	0.12902	0.14174	0.56846	9.6990	1.921	3.7022	5.01
24	31	8.30974	6.22154	9.99432	0.14079	0.53027	n0.2041	1.912	3.3905	5.11
25	1850.—Jan. 1	8.84594	7.29393	9.73448	0.13759	0.47531	9.9031	1.884	2.9875	5.23
26	2	9.08016	7.76238	8.89818	0.13548	0.41015	9.0000	1.866	2.5713	5.11
27	4	9.34325	8.28856	n9.65292	0.12943	0.32986	0.0000	1.815	2.1373	5.29
28	6	9.50279	8.60764	n0.20082	0.11684	0.03326	0.0792	1.713	1.0796	4.14
29		9.50739	8.61684	n0.21021	0.11954	0.02420	9.9542	1.734	1.0573	2.89
30	7	9.56803	8.73812	n0.34467	0.11892	9.72280	0.1461	1.729	+ 0.5282	4.92
31	8	9.62318	8.84842	n0.45367	0.11532	n8.67943	0.0414	1.701	— 0.0478	4.68
32	9	9.67169	8.94544	n0.54067	0.11158	n9.79386	0.0000	1.672	— 0.6221	4.68
33	10	9.71622	9.03450	0.34796	0.10705	0.71065	n0.0414	1.637	+ 5.1363	4.60
34	11	9.75564	9.11334	0.20132	0.10299	0.65866	n0.1139	1.607	4.5568	4.60
35	12	9.79190	9.18586	9.97442	0.09998	0.59927	n9.8451	1.585	3.9744	4.69
36	13	9.82532	9.25270	9.48657	0.09586	0.53165	n9.4771	1.555	3.4013	4.60
37	14	9.85695	9.31596	n9.51786	0.09161	0.45204	n9.4771	1.525	2.8317	4.85
38	15	9.88600	9.37406	n9.97918	0.08757	0.35715	0.0000	1.497	2.2759	4.75
39		9.88752	9.37710	n9.98704	0.07389	0.34733	n0.2553	1.405	2.2250	1.70
40	16	9.91332	9.42870	n0.19153	0.08333	0.24172	n9.6990	1.468	1.7447	4.91
41	17	9.93903	9.48012	n0.33199	0.07899	0.08736	—	1.439	1.2228	5.02
42	18	9.96334	9.52874	n0.43433	0.07459	9.86082	9.4771	1.410	0.7258	4.85
43	19	9.98586	9.56358	0.49203	0.07081	0.82060	n0.7404	1.386	6.6160	1.70
44	20	0.00763	9.61732	0.40971	0.06653	0.79001	n0.5911	1.358	6.1662	4.13
45	21	0.02871	9.65948	0.31377	0.06198	0.75875	n0.6232	1.330	5.7378	4.57
46	22	0.04863	9.69932	0.19634	0.05621	0.72662	n0.4914	1.295	5.3287	4.82
47	23	0.06730	9.73666	0.05119	0.05360	0.69631	n0.4150	1.280	4.9694	4.13
48		0.06821	9.73848	0.04793	0.04200	0.69340	n0.6435	1.213	4.9362	3.21
49	24	0.08590	9.77386	9.84553	0.04705	0.66538	n0.5051	1.242	4.6279	4.75
50	25	0.10320	9.80846	9.49748	0.04368	0.63667	n0.5563	1.223	4.3318	4.75
51	26	0.12002	9.84210	n8.73878	0.03870	0.60766	n0.5315	1.195	4.0519	4.57
52	27	0.13591	9.87388	n9.59184	0.03591	0.58103	n0.5185	1.180	3.8109	4.66
53	28	0.15173	9.90552	n9.85522	0.02952	0.55345	n0.3802	1.146	3.5764	4.79
54	29	0.16657	9.93520	n9.99577	0.02662	0.53171	n0.5315	1.130	3.4018	4.75
55	31	0.19522	9.99250	n0.17131	0.01698	0.49231	n0.4914	1.081	+ 3.1068	4.90

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

MARS I.

Equatorial, Santiago.

N°.	Date.	Wash. M.T.	Obs'd. r.	2τ.	$\frac{1}{2} D_t \delta_0$	$\mp \tau D_t \delta_0$	r_0	n.	log. e.	log. s.	log. n.	p.
			″		″	″	″	″				
1	1849.—Dec. 10	.5155	9.19	0.329	+0.443	+0.15	8.03	—1.01	0.23602	0.43488	n0.0043	3.77
2	11	.4277	11.14	0.020	0.426	0.01	8.03	3.10	0.23609	0.43493	n0.4914	1.95
3		.4646	10.49	0.296	0.425	0.13	8.03	2.59	0.23609	0.43493	n0.4133	3.86
4		.5093	10.24	0.004	0.424	0.00	8.03	2.21	0.23609	0.43493	n0.3444	2.83
5	12	.4118	11.04	0.014	0.395	0.01	8.03	3.00	0.23604	0.43490	n0.4771	1.95
6		.4452	10.04	0.388	0.394	0.13	8.03	2.12	0.23604	0.43490	n0.3263	2.67
7	13	.4914	10.31	0.025	0.360	0.01	8.03	2.27	0.23581	0.43475	n0.3560	4.60
8	14	.4731	10.08	0.011	0.328	0.00	8.02	2.06	0.23543	0.43451	n0.3139	4.37
9	15	.4159	10.45	0.038	0.297	0.01	8.01	2.45	0.23491	0.43417	n0.3892	3.77
10		.4890	10.30	0.259	0.295	0.08	8.01	2.37	0.23486	0.43414	n0.3747	4.42
11	16	.4107	9.70	0.107	0.264	0.03	8.00	1.67	0.23423	0.43374	n0.2227	5.24
12	17	.4542	9.10	0.355	0.230	0.08	7.98	1.04	0.23333	0.43318	n0.0170	4.91
13	18	.4312	9.52	1.003	0.198	+0.20	7.96	1.33	0.23234	0.43256	n0.1239	4.28
14	20	.4267	9.32	1.168	0.133	—0.16	7.92	1.60	0.22986	0.43099	n0.2041	3.50
15		.5161	8.72	2.914	0.131	0.38	7.91	1.09	0.22973	0.43091	n0.0374	2.67
16	21	.4165	10.52	1.148	0.103	0.12	7.89	2.79	0.22840	0.43007	n0.4456	2.25
17	22	.4455	10.04	0.790	0.072	0.06	7.86	2.24	0.22673	0.42903	n0.3502	4.24
18	23	.4225	9.73	0.530	0.044	0.02	7.83	1.92	0.22500	0.42794	n0.2833	4.50
19	24	.4316	10.02	0.531	+0.015	—0.01	7.79	2.44	0.22307	0.42673	n0.3874	4.80
20	25	.4289	9.63	0.239	—0.011	+0.00	7.76	1.87	0.22102	0.42545	n0.2718	4.88
21	26	.4297	9.99	0.322	0.036	0.01	7.72	2.26	0.21883	0.42409	n0.3541	5.14
22	27	.4395	9.96	0.350	0.060	0.02	7.68	2.26	0.21649	0.42262	n0.3541	4.77
23	30	.4008	9.86	0.275	0.121	0.03	7.55	2.28	0.20887	0.41790	n0.3579	4.53
24	31	.4081	9.55	0.405	0.139	0.06	7.50	1.99	0.20602	0.41614	n0.2989	4.70
25	1850.—Jan. 1	.4027	10.02	0.019	0.155	0.03	7.44	2.55	0.20312	0.41436	n0.4065	4.91
26	2	.4054	9.90	0.604	0.169	0.10	7.39	2.41	0.20008	0.41249	n0.3820	4.70
27	4	.4084	9.73	0.338	0.192	0.07	7.29	2.37	0.19370	0.40859	n0.3747	5.00
28	6	.3654	9.82	0.714	0.209	0.15	7.18	2.51	0.18708	0.40457	n0.3997	3.27
29		.4331	9.65	1.039	0.209	0.22	7.17	2.23	0.18685	0.40443	n0.3483	1.95
30	7	.3970	9.82	0.019	0.215	0.00	7.12	2.70	0.18347	0.40238	n0.4314	4.37
31	8	.3985	10.09	0.731	0.220	0.16	7.06	2.82	0.17986	0.40021	n0.4502	4.00
32	9	.3913	9.75	0.883	0.223	0.20	7.00	2.55	0.17623	0.39803	n0.4065	4.00
33	10	.4053	9.79	1.045	0.224	0.23	6.94	2.62	0.17241	0.39574	n0.4183	3.86
34	11	.3939	9.38	0.935	0.224	0.21	6.88	2.29	0.16864	0.39348	n0.3598	3.86
35	12	.3859	9.30	0.952	0.223	0.21	6.82	2.27	0.16479	0.39121	n0.3560	4.00
36	13	.3768	10.25	0.853	0 221	0.19	6.76	3.30	0.16089	0.38889	n0.5185	3.86
37	14	.3872	9.25	0.734	0.217	0.16	6.69	2.40	0.15686	0.38651	n0.3802	4.24
38	15	.3825	9.44	0.672	0.212	+0.14	6.63	2.67	0.15283	0.38413	n0.4265	4.13
39		.4364	7.80	0.797	0.212	—0.17	6.62	1.35	0.15261	0.38400	n0.1303	1.00
40	16	.3817	9.29	0.088	0.207	+0.02	6.57	2.70	0.14873	0.38173	n0.4314	4.33
41	17	.3803	9.48	0.656	0.201	0.13	6.51	2.84	0.14460	0.37932	n0.4533	4.50
42	18	.3801	9.76	0.465	0.194	0.09	6.45	3.22	0.14042	0.37689	n0.5079	4.24
43	19	.3591	9.36	2.364	0.186	0.44	6.38	2.54	0.13631	0.37451	n0.4048	1.00
44	20	.3547	8.27	0.614	0.178	0.11	6.32	1.84	0.13208	0.37208	n0.3096	3.27
45	21	.3672	8.85	0.795	0.170	0.13	6.26	2.46	0.12776	0.36959	n0.3909	3.86
46	22	.3694	8.26	0.664	0.160	0.11	6.20	1.95	0.12345	0.36713	n0.2900	4.24
47	23	.3519	8.33	0.800	0.151	0.12	6.14	2.07	0.11921	0.36471	n0.3160	3.27
48		.4074	7.93	0.144	0.150	0.02	6.14	1.77	0.11897	0.36457	n0.2480	2.25
49	24	.3738	8.23	0.793	0.142	0.11	6.08	2.04	0.11478	0.36220	n0.3096	4.13
50	25	.3646	7.74	0.676	0.132	0.09	6.02	1.63	0.11047	0.35977	n0.2122	4.13
51	26	.3658	8.92	1.518	0.123	0.19	5.96	2.76	0.10610	0.35732	n0.4393	3.86
52	27	.3485	7.45	1.015	0.114	+0.12	5.90	1.43	0.10179	0.35490	n0.1553	3.99
53	28	.3628	8.02	0.008	0.104	—0.00	5.84	2.18	0.09734	0.35242	n0.3385	4.18
54	29	.3492	7.55	0.629	0.095	+0.06	5.78	1.71	0.09302	0.35002	n0.2330	4.13
55	31	.3512	7.85	0.516	—0.077	+0.04	5.66	—2.05	0.08423	0.34519	n0.3118	4.33

FORMATION OF EQUATIONS OF CONDITION.

MARS I.

Equatorial, Washington.

(BOTH LIMBS OBSERVED THROUGHOUT.)

N°.	Date.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.	p.
1	1849.—Nov. 2	n0.46535	0.53276	n9.56709	0.05022	0.8129	0.1362	+ 1.1226	2.57
2	4	n0.45060	0.50326	n9.63127	9.97128	0.6435	0.1830	0.9360	3.43
3		n0.45023	0.50252	n9.56947	9.99550	0.6435	0.1377	0.9897	3.73
4	6	n0.43496	0.47198	n9.63292	9.90993	0.5798	0.1844	0.8127	3.84
5	12	n0.38426	0.37058	n9.62111	9.70492	0.8062	0.1747	0.5069	3.87
6		n0.38372	0.36950	n9.56528	9.74453	0.8062	0.1351	0.5553	3.27
7	13	n0.37551	0.35308	n9.66434	9.62201	0.8976	0.2131	0.4188	3.79
8	24	n0.26117	0.12440	n9.64391	8.82317	0.7634	0.1940	0.0666	3.60
9	26	n0.23667	0.07540	n9.63064	8.57864	0.6812	0.1825	0.0379	4.83
10		n0.23555	0.07316	n9.58044	8.91803	0.5315	0.1448	+ 0.0828	4.34
11	Dec. 6	n0.08828	9.77862	n9.66374	n8.42160	0.9445	0.1612	— 0.0264	4.57
12		n0.08803	9.77812	n9.58829	n8.08636	0.7853	0.1502	0.0122	4.49
13	11	n9.99044	9.58294	n9.65828	n8.70501	0.3617	0.2073	— 0.0507	4.03
14	12	n9.96704	9.53614	n9.60719	8.07918	0.8513	0.1638	+ 0.0120	4.39
15	17	n9.83106	9.26418	n9.59666	9.04493	0.5315	0.1561	0.1109	5.15
16	27	n9.25556	8.11318	n9.59061	9.64670	0.5051	0.1518	0.4433	5.22
17	31	8.29509	6.19224	n9.56366	9.81544	0.3617	0.1341	0.6538	4.82
18	1850.—Jan. 5	9.43002	8.46210	n9.54320	9.97722	9.7782	0.1220	0.9469	4.83
19	9	9.67030	8.94266	n9.54162	0.08196	n0.4914	0.1211	1.2077	4.32
20	12	9.79036	9.18278	n9.54531	0.15183	9.4771	0.1232	1.4185	4.30
21	14	9.85644	9.31494	n9.49884	0.20672	n9.6021	0.0995	1.6096	2.64
22	22	0.04802	9.69810	n9.47696	0.36474	n0.1139	0.0900	2.3160	4.71
23	29	0.16545	9.93296	n9.50285	0.47749	n0.1461	0.1013	+ 3.0025	3.21

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

MARS I.

Equatorial, Washington.

N°.	Date.	Wash. M.T.	Obs'd r.	2τ.	$\frac{1}{2}D_t\delta_o$.	$\mp\tau D_t\delta_o$.	r_o	n.	log. e.	log. s.	log. n.	p.
			″			″	″	″				
1	1849.—Nov. 2	.8189	10.43	1.976	+ 0.510	— 0.99	6.60	—4.84	0.15127	0.38322	n0.6849	2.25
2	4	.7681	11.45	0.240	0.536	+ 0.13	6.71	4.56	0.15778	0.38705	n0.6590	3.00
3, 4		.8159	9.26	0.002	0.536	— 0.00	6.71	2.57	0.15794	0.38714	n0.4099	3.50
5	12	.7639	13.90	0.002	0.642	0.00	7.11	6.83	0.18349	0.40269	n0.8344	4.75
6		.8248	12.65	0.002	0.643	0.00	7.11	5.55	0.18367	0.40250	n0.7443	3.27
7	13	.7307	10.83	0.002	0.654	— 0.00	7.16	3.73	0.18643	0.40417	n0.5717	4.50
8	24	.7214	10.02	0.504	0.716	+ 0.36	7.66	1.95	0.21352	0.42078	n0.2900	3.00
9	26	.7236	11.01	0.002	0.708	— 0.00	7.74	3.31	0.22001	0.42482	n0.5198	5.12
10		.8120	11.23	0.002	0.708	— 0.00	7.74	3.50	0.22018	0.42492	n0.5441	4.13
11, 12	Dec. 6	.4918	11.17	0.989	0.566	+ 0.56	7.99	2.60	0.23418	0.43371	n0.4150	3.77
13	11	.4356	11.96	0.080	0.425	0.04	8.03	3.83	0.23611	0.43494	n0.5832	3.13
14	12	.4619	11.55	0.571	0.395	+ 0.23	8.03	3.25	0.23604	0.43490	n0.5119	3.59
15	17	.4452	9.80	1.311	+ 0.230	— 0.30	7.98	2.16	0.23334	0.43318	n0.3345	4.71
16	27	.3976	9.20	0.032	— 0.059	+ 0.00	7.68	1.56	0.21659	0.42269	n0.1931	4.85
17	31	.3952	12.18	0.297	0.139	— 0.04	7.50	4.69	0.20608	0.41618	n0.6712	4.24
18	1850.—Jan. 5	.3833	10.11	2.317	0.201	0.47	7.23	3.31	0.19044	0.40661	n0.5198	4.24
19	9	.3612	7.73	0.661	0.223	0.15	7.00	0.85	0.17632	0.39808	n9.9294	3.50
20	12	.3419	8.45	0.159	0.223	0.04	6.82	1.63	0.16497	0.39130	n0.2122	3.42
21	14	.3703	9.59	0.783	0.217	0.17	6.69	3.05	0.15693	0.38655	n0.4843	1.71
22	22	.3385	7.46	0.527	0.161	0.08	6.20	1.32	0.12358	0.36720	n0.1206	4.06
23	29	.2753	8.54	0.600	— 0.096	— 0.06	5.78	—2.78	0.09335	0.35021	n0.4440	2.25

FORMATION OF EQUATIONS OF CONDITION.

MARS I.

Equatorial, Cape of Good Hope.

(BOTH LIMBS OBSERVED THROUGHOUT.)

N°.	Date.	log. b.	log. c.	log. f.	log. g.	log. s.	log. n.	k^2.	s.	p.
1	1849.—Nov. 21	n0.29768	0.19742	0.78061	0.13902	0 90320	0.5051	1.8969	+8.0021	2.58
2		n0.29768	0.19742	9.72933	0.13902	0.39868	0.6990	1.8969	2.5043	2.66
3	22	n0.28597	0.17400	0.43476	0.13916	0.66838	0.6232	1.8981	4.6599	2.66
4	24	n0.26328	0.12862	0.50742	0.14864	0.71064	0.6902	1.9828	5.1361	2.56
5	25	n0.25142	0.10490	n9.86314	0.15139	0.07060	0.6990	2.0081	+1.1765	3.11
6		n0.25142	0.10490	n0.36882	0.15139	n9.63518	0.6902	2.0081	−0.4317	2.94
7	26	n0.23881	0.07968	0.13975	0.15143	0.51391	0.5563	2.0085	+3.2652	3.11
8	27	n0.22657	0.05520	n0.44438	0.15572	n9.95434	0.7559	2.0485	−0.9002	3.83
9	28	n0.21355	0.02916	n9.88497	0.15779	0.04340	0.7076	2.0681	+1.1051	3.69
10	29	n0.19959	0.00124	0.11535	0.15501	0.49866	0.5798	2.0418	3.1525	2.94
11	30	n0.18655	9.97516	0.49782	0.15858	0.69853	0.5441	2.0757	4.9949	2.44
12	Dec. 1	n0.17187	9.94580	0.41987	0.16361	0.65169	0.6812	2.1243	4.4842	2.58
13	2	n0.15618	9.91442	0.66500	0.15552	0.80907	0.5682	2.0466	+6.4427	2.42
14	3	n0.14168	9.88542	n0.48352	0.16680	n0.07696	0.7924	2.1557	−1.1939	3.20
15	4	n0.12579	9.85364	n0.09861	0.16813	9.77517	0.7076	2.1690	+0.5959	3.60
16	5	n0.10938	9.82082	9.65753	0.16912	0.36288	0.7324	2.1789	2.3061	3.89
17	6	n0.09200	9.78606	0.32990	0.17038	0.60130	0.7404	2.1916	3.9930	4.65
18	7	n0.07438	9.75082	0.57108	0.17105	0.74694	0.5798	2.1983	5.5839	4.65
19	8	n0.05541	9.71288	0.72084	0.17177	0.85269	0.6990	2.2056	7.1235	4.65
20	9	n0.03576	9.67358	0.82755	0.17147	0.93412	0.6335	2.2026	8.5927	2.00
21		n0.03580	9.67366	1.02548	0.17175	1.09604	0.6435	2.2054	+12.4750	2.62
22	10	n0.01436	9.63078	n0.63601	0.15696	n0.39724	0.5563	2.0602	−2.4960	2.94
23	11	n9.99392	9.58990	n0.49322	0.17184	n0.08814	0 6435	2.2064	−1.2250	1.77
24	14	n9.92305	9.44816	9.25115	0.17323	0.32457	0.4624	2.2206	+2.1114	3.13
25	15	n9.89678	9.39562	0.03318	0.17241	0.48100	0.4624	2.2122	3.0269	3.13
26	16	n9.86848	9.33902	0.28292	0.17175	0.58917	0.0414	2.2054	3.8830	3.13
27		n9.86751	9.33708	0.28565	0.17062	0.59015	0.3979	2.1940	3.8918	3.60
28	17	n9.83688	9.27582	0.42431	0.16841	0.66577	0.4624	2.1718	4.6320	3.60
29	18	n9.80447	9.21100	0.51655	0.16903	0.72313	0.4150	2.1780	5.2860	3.60
30	20	n9.73124	9.06454	n0.02824	0.16817	9.99260	0.6021	2.1694	0.9831	3.54
31	21	n9.68765	8.97736	n9.85034	0.16112	0.12985	0.5798	2.1001	1.3485	3.54
32	22	n9.64141	8.88488	n9.64513	0.16258	0.21780	0.5185	2.1143	1.6512	3.54
33	23	n9.59066	8.78338	n9.41095	0.16366	0.27212	0.4314	2.1248	1.8712	3.68
34	24	n9.52841	8.65888	n9.20412	0.15464	0.29572	0.4624	2.0384	1.9757	3.15
35	25	n9.46338	8.52882	n9.15045	0.15897	0.31042	0.5051	2.0794	2.0437	3.82
36		n9.46181	8.52568	n9.16584	0.15969	0.31004	0.5682	2.0863	2.0419	3.82
37	26	n9.38297	8.36800	n9.29358	0.15452	0.30374	0.5441	2.0372	2.0125	3.82
38		n9.38003	8.36212	8.73159	0.15760	0.35683	0.3617	2.0663	2.2742	3.93
39	29	n8.95689	7.51584	n9.88372	0.15033	0.19346	0.5051	1.9983	1.5612	2.81
40	1850.—Jan. 7	9.55489	8.71184	0.79161	0.12026	0.95028	0.1461	1.7399	8.9183	2.59
41	8	9.61193	8.82592	0.74582	0.11451	0.92155	9.7782	1.6945	8.3474	2.59
42	9	9.66035	8.92276	0.69383	0.11467	0.89124	0.3222	1.6957	7.7846	3.55
43	10	9.70544	9.01294	0.63510	0.11079	0.85638	—	1.6657	7.2173	3.55
44	11	9.74662	9.09530	0.56367	0.10576	0.82085	9.3010	1.6275	6.6198	2.59
45	12	9.78403	9.17012	0.47820	0.10071	0.77993	9.6021	1.5901	6.0246	2.59
46	14	9.81789	9.23784	0.24239	0.09388	0.68297	n9.0000	1.5408	4.8191	3.16
47	15	9.84913	9.30032	0.05258	0.09095	0.63020	9.6990	1.5202	4.2678	3.16
48	16	9.90715	9.41636	9.71299	0.08528	0.57997	n9.6021	1.4810	3.8016	3.16
49	17	9.93267	9.46740	n8.76641	0.08254	0.51861	n0.0414	1.4624	+3.3007	2.14

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

MARS I.

Equatorial, Cape of Good Hope.

N°.	Date.	Wash. M.T.	Obs'd r.	2τ	$\mp\tau D_t\delta_0$	r_0	n	log. e.	log. s.	log. n.	p.
			″		″	″	″				
1,2	1849.—Nov. 21	.3070	9.49	2.74	+ 1.96	7.53	+ 0.02	0.20817	0.41747	8.3010	1.71
3	22	.3634	6.38	1.76	— 1.26	7.57	— 0.05	0.21078	0.41908	n8.6990	1.71
4	24	.3296	10.08	2.06	+ 1.47	7.66	— 0.94	0.21536	0.42192	n9.9731	1.71
5,6	25	.3174	6.49	1.53	— 1.09	7.69	+ 0.11	0.21753	0.42327	9.0414	2.25
7	26	.3390	7.14	1.31	0.93	7.73	— 0.30	0.21966	0.42460	n9.4771	2.25
8	27	.3021	8.04	0.67	0.47	7.77	0.75	0.22157	0.42579	n9.8751	3.50
9	28	.2979	7.52	0.68	0.47	7.80	0.20	0.22343	0.42696	n9.3010	3.27
10	29	.3321	7.30	0.85	0.58	7.83	0.03	0.22526	0.42810	n8.4771	2.25
11	30	.2789	7.58	1.00	— 0.67	7.86	0.37	0.22676	0.42905	n9.5682	1.71
12	Dec. 1	.2902	8.28	0.04	+ 0.03	7.89	— 0.36	0.22836	0.43005	n9.5563	1.95
13	2	.3444	6.43	1.70	— 1.10	7.92	+ 0.39	0.22984	0.43098	9.5911	1.71
14	3	.2852	7.31	0.88	0.55	7.94	0.08	0.23103	0.43173	8.9031	2.25
15	4	.2812	7.08	0.71	0.43	7.96	0.45	0.23215	0.43243	9.6532	2.67
16	5	.2718	7.54	0.55	0.32	7.98	0.11	0.23316	0.43307	9.0414	3.00
17	6	.2813	6.03	0.17	0.10	7.99	+ 1.86	0.23402	0.43361	0.2695	4.00
18	7	.2637	8.36	0.27	0.15	8.00	— 0.52	0.23472	0.43406	n9.7160	4.00
19	8	.2784	7.49	0.30	0.15	8.01	+ 0.38	0.23530	0.43442	9.5798	4.00
20,21	9	.2824	6.57	1.64	0.80	8.02	0.66	0.23573	0.43470	9.8195	1.48
22	10	.3274	7.16	1.68	0.77	8.03	+ 0.08	0.23600	0.43487	8.9031	2.67
23	11	.2780	7.79	1.17	0.50	8.03	— 0.44	0.23611	0.43494	n9.6434	1.26
24	14	.2474	7.68	0.86	0.29	8.02	+ 0.05	0.23552	0.43456	8.6990	3.00
25	15	.2306	7.38	0.54	0.16	8.01	+ 0.46	0.23502	0.43424	9.6628	3.00
26	16	.2255	9.09	0.43	0.12	8.00	— 1.22	0.23436	0.43383	n0.0864	3.00
27		.2586	8.43	0.00	0	8.00	— 0.41	0.23434	0.43382	n9.6128	4.00
28	17	.2626	7.35	0.24	0.06	7.98	+ 0.59	0.23351	0.43329	9.7709	4.00
29	18	.2503	6.83	0.37	0.07	7.96	+ 1.08	0.23253	0.43267	0.0334	4.00
30	20	.2288	7.99	0.87	0.12	7.92	— 0.19	0.23013	0.43116	n9.2787	2.67
31	21	.2573	7.81	0.66	0.07	7.89	+ 0.04	0.22864	0.43022	8.6021	2.67
32	22	.2413	7.62	0.50	0.04	7.86	0.22	0.22707	0.42924	9.3424	2.67
33	23	.2072	6.80	0.35	— 0.02	7.83	1.01	0.22539	0.42819	0.0043	1.00
35,36	25	.1975	7.42	0.26	+ 0.00	7.76	0.34	0.22151	0.42576	9.5315	3.00
37,38	26	.1857	7.44	0.37	0.02	7.73	0.30	0.21938	0.42443	9.4771	3.00
39	29	.1890	7.51	0.04	0.00	7.61	0.10	0.21211	0.41991	9.0000	1.95
40	1850.—Jan. 7	.1766	7.20	2.14	0.46	7.13	+ 0.40	0.18424	0.40285	9.6021	1.71
41	8	.1838	7.59	1.82	0.40	7.07	— 0.10	0.18064	0.40068	n9.0000	1.71
44	11	.1598	6.25	1.76	0.39	6.89	+ 1.04	0.16954	0.39402	0.0170	1.71
45	12	.1636	5.75	1.61	0.36	6.83	1.46	0.16566	0.39171	0.1644	1.71
46	14	.1498	6.27	1.42	0.31	6.71	0.76	0.15781	0.38706	9.8808	2.25
47	15	.1305	5.55	1.41	0.30	6.64	1.39	0.15385	0.38473	0.1430	2.25
48	16	.1504	6.33	0.36	0.07	6.58	0.33	0.14968	0.38228	9.5185	2.25
49	17	.1277	6.62	1.32	+ 0.27	6.52	+ 0.17	0.14565	0.37993	9.2305	2.25

FORMATION OF EQUATIONS OF CONDITION.

MARS I.

Meridian, Cape of Good Hope.

N°.	Date.	Limb.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.
1	1849.—Nov. 18	N. S.	n0.32899	0.26004	0.13244	0.31035	0.60531	1.84	+ 2.0434
2	19	N. S.	n0.31872	0.23950	0.13538	0.30501	0.55509	1.87	2.0184
3	21	N. S.	n0.29743	0.19692	0.14107	0.29535	0.65610	1.92	1.9740
4	22	N. S.	n0.28638	0.17480	0.14378	0.29104	9.44716	1.94	1.9545
5	25	N. S.	n0.25143	0.10492	0.15143	0.28021	0.95809	2.01	1.9064
6	27	N. S.	n0.22647	0.05500	0.15575	0.27460	0.61805	2.05	1.8819
7	28	N. S.	n0.21344	0.02894	0.15807	0.27258	0.63448	2.07	1.8732
8	29	N. S.	n0.19999	0.00204	0.16008	0.27080	0.56585	2.09	1.8655
9	30	N. S.	n0.18611	9.97428	0.16196	0.26940	0.82086	2.11	1.8595
10	Dec. 1	N. S.	n0.17179	9.94564	0.16372	0.26834	0.79727	2.13	1.8550
11	2	N. S.	n0.15697	9.91600	0.16535	0.26766	0.58092	2.14	1.8521
12	3	N. S.	n0.14164	9.88534	0.16683	0.26736	0.68931	2.16	1.8508
13	4	N. S.	n0.12574	9.85354	0.16818	0.26736	0.45332	2.17	1.8508
14	6	N. S.	n0.09208	9.78622	0.17046	0.26853	0.67486	2.19	1.8558
15	7	N. S.	n0.07422	9.75050	0.17136	0.26961	0.53020	2.20	1.8604
16	8	N. S.	n0.05559	9.71324	0.17212	0.27103	0.57519	2.21	1.8665
17	9	N. S.	n0.03613	9.67432	0.17271	0.27277	0.40140	2.22	1.8740
18	10	N. S.	n0.01576	9 63358	0.17315	0.27485	0.75358	2.22	1.8830
19	11	N. S.	n9.99438	9.59082	0.17342	0.27724	0.71600	2.22	1.8934
20	12	N. S.	n9.97189	9.54584	0.17352	0.27996	0.73239	2.22	1.9053
21	14	N. S.	n9.92310	9.44826	0.17325	0.28628	0.52114	2.22	1.9332
22	15	N. S.	n9.89650	9.39506	0.17283	0.28988	9.97313	2.22	1.9493
23	16	N. S.	n9.86813	9.33832	0.17228	0.29374	0.36361	2.21	1.9667
24	17	N. S.	n9.83780	9.27766	0.17154	0.29787	n0.33041	2.20	1.9856
25	18	N. S.	n9.80517	9.21240	0.17063	0.30231	0.29003	2.19	2.0059
26	20	N. S.	n9.73153	9.06512	0.16834	0.31192	0.40483	2.17	2.0508
27	21	N. S.	n9.68940	8.98086	0.16695	0.31710	0.30750	2.16	2.0754
28	22	N. S.	n9.64276	8.88758	0.16537	0.32249	0.32428	2.14	2.1013
29	23	N. S.	n9.59050	8.78306	0.16368	0.32816	0.46687	2.13	2.1289
30	24	N. S.	n9.53108	8.66422	0.16182	0.33405	0.62839	2.11	2.1580
31	26	N. S.	n9.38034	8.36274	0.15766	0.34649	0.52504	2.07	2.2207
32	27	N. S.	n9.27935	8.16076	0.15536	0.35301	0.32428	2.05	2.2543
33	29	N. S.	n8.95874	7.51954	0.15036	0.36663	0.34242	2.00	2.3261
34	81	N. S.	7.95228	5.50662	0.14484	0.38108	0.35411	1.95	2.4048
35	1850.—Jan. 3	N. S.	9.19990	8.00181	0.13569	0.40403	n9.98677	1.87	2.5353
36	4	N. S.	9.31864	8.23934	0.13242	0.41199	n0.18752	1.84	2.5822
37	7	N. S.	0.55359	8.70924	0.12205	0.43672	0 36173	1.75	2.7335
38	8	C.	9.61023	8.82250	0.11840	0.44521	0.05308	1.73	2.7875
39	9	C.	9.66032	8.92270	0.11468	0.45382	n0.48144	1.70	2.8433
40	10	C.	9.70523	9.01252	0.11089	0.46256	n0.38917	1.67	2.9011
41	11	C.	9.74593	9.09392	0.10702	0.47138	n9.88649	1.64	2.9606
42	12	C.	9.78314	9.16834	0.10310	0 48032	n0.27875	1.61	3.0222
43	14	C.	9.84918	9.30042	0.09506	0.49845	n0.34242	1.55	3.1510
44	15	C.	9.87878	9.35964	0.09097	0.50764	n0.36549	1.52	3.2184
45	16	C.	9.90650	9.41506	0.08682	0.51689	n0.30963	1.49	3.2877
46	17	C.	9.93256	9.46̇18	0.08263	0.52621	n0.24304	1.46	+ 3.3590

FORMATION OF EQUATIONS OF CONDITION.

MARS I.

Equatorial, Greenwich.

(OBSERVED CENTRE.)

N°.	Date.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.	p.
1	1849.—Nov. 26	n0.24150	0.08506	n0.05695	n9.82445	0.0414	1.300	— 0.6675	2.49
2	30	n0.18550	9.97306	n9.86027	n9.50215		0.526	0.3178	
3	Dec. 8	n0.05720	9.71646	n9.94918	n9.70731		0.792	0.5097	
4	15	n9.89563	9.39332	n9.86045	n9.42193	0.3802	0.526	0.2642	3.62
5	27	n9.29508	8.19222	n9.99382	n9.22427	9.9031	0.972	— 0.1676	4.15
6	1850—Jan. 4	9.31989	8.24184	n9.82577	9.74578	n0.2553	0.448	+ 0.5569	3.21
7	5	9.40716	8.41638	n9.87292	9.72852	n0.0414	0.557	0.5352	3.52
8	7	9.55207	8.70620	n9.83910	9.85546	n0.2788	0.476	+ 0.7169	3.21

FORMATION OF EQUATIONS OF CONDITION.

MARS I.

Meridian, Greenwich.

N°.	Date.	Limb.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.
1	1849.—Nov. 1	C.	n0.47393	0.54932	n9.80336	9.96783	n0.00000	0.4043	+ 0.9286
2	6	C.	n0.43595	0.47396	n9.81685	9.77357	0.47712	0.4302	0.5937
3	16	C.	n0.34832	0.29870	n9.84024	8.82607	0.60206	0.4792	0.0670
4	30	N.	n0.18539	9.97286	n9.86022	9.83385	0.69020	0.5253	0.6821
5	Dec. 4	N.	n0.12490	9.85186	n9.86196	9.81298	0.59106	0.5296	0.6501
6	8	N.	n0.05461	9.71128	n9.86214	9.81451	0.51851	0.5300	0.6524
7	15	N.	n9.89508	9.39222	n9.85809	9.86929	0.68124	0.5202	0.7401
8	17	N.	n9.83617	9.27440	n9.85590	9.89470	0.59106	0.5150	0.7847
9	19	N.	n9.76802	9.13810	n9.85324	9.92324	0.54407	0.5087	0.8380
10	27	N.	n9.27347	8.14900	n9.83829	0.05587	9.00000	0.4749	1.1373
11	28	N.	n9.13955	7.88116	n9.83596	0.07346	0.20412	0.4698	1.1843
12	29	N.	n8.94488	7.49182	n9.83354	0.09110	0.04139	0.4646	1.2334
13	1850.—Jan. 4	N.	9.32394	8.24994	n9.81704	0.19656	0.07918	0.4306	1.5724
14	5	N.	9.41608	8.43422	n9.81399	0.21376	9.69897	0.4246	1.6363
15	7	N.	9.55668	8.71442	n9.80765	0.24795	9.77815	0.4124	1.7699
16	23	N.	0.06366	9.72938	n9.74777	0.49620	n0.14613	0.3130	3.1347
17	30	N.	0.17810	9.95826	n9.71835	0.59024	n0.55630	0.2733	3.8926
18	Feb. 6	N.	0.26861	0.13928	n9.68823	0.67637	n0.71600	0.2379	4.7464
19	7	N.	0.28012	0.16230	n9.68393	0.68807	n0.74819	0.2333	4.8761
20	9	N.	0.30229	0.20664	n9.67529	0.71110	n0.78533	0.2242	5.1416
21	13	S.	0.34349	0.28904	n9.65815	0.56771	n0.78533	0.2072	3.6958
22	16	N.	0.37200	0.34606	n9.64544	0.78757	n0.83251	0.1954	6.1316
23	21	C.	0.41574	0.43354	n9.62466	0.77062	n0.78533	0.1775	5.8968
24	22	C.	0.42400	0.45006	n9.62065	0.78217	n0.77815	0.1743	+ 6.0558

FORMATION OF EQUATIONS OF CONDITION.

MARS I.

Equatorial, Cambridge.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. g.	log. s.	log. n.	k^2	s.	p.
1	1849.—Nov. 14	C.	n0.36537	0.33280		n9.66331	9.57031	0.6812	0.212	+0.3718	3.05
2	15	N.	n0.35469	0.31144	0.19304	n9.80830	0.43171	0.3979	0.413	+2.7021	1.61
3		S.	n0.35461	0.31128	n0.19306	n9.82259	n0.38725	0.7482	0.442	−2.4392	2.91
4	16	C.	n0.34792	0.29790		n9.83275	8.88762	0.6128	0.463	+0.0772	3.24
5		S.	n0.34473	0.29152	n0.19598	n9.85888	n0.40618	0.6232	0.522	−2.5479	2.42
6	21	C.	n0.29608	0.19422		n9.79181	n8.51322	0.6812	0.383	−0.0326	3.89
7		C.	n0.29290	0.18786		n9.85324	n9.13033	0.7404	0.508	0.1350	3.70
8	26	S.	n0.23354	0.06914	n0.22050	n9.91796	n0.48130	0.7404	0.686	−3.0290	3.62
9	30	N.	n0.17980	9.96166	0.22754	n9.91300	0.35658	0.6628	0.670	+2.2729	2.28
10	Dec. 11	C.	n9.99349	9.58904		n9.91817	n9.68520	0.5798	0.787	−0 4844	3.52
11	17	N.	n9.83463	9.27132	0.23344	n9.84016	0.40195	0.4914	0.479	+2.5232	3.62
12	27	N.	n9.26371	8.12948	0.21675	n9.77146	0.46036	0.2788	0.349	+2.8864	3.93
13	28	S.	n9.13268	7.86742	n0.21442	n9.73024	n0.36248	n0.4150	0.288	−2.3040	2.18
14		C.	n9.12292	7.84790		n9.72652	9.53339	n9.7782	0.284	+0.3415	3.00
15	29	N.	n8.80577	7.21360	0.21071	n0.04085	0.39157		1.208	+2.4636	
16	31	S.	8.35917	6.32040	n0.20589	n9.64671	n0.30758	0.0792	0.196	−2.0304	4.83
17	1850.—Jan. 1	C.	8.80777	7.21760		n9.79451	9.64631	0.4771	0.388	+0.4429	4.75
18	4	N.	9.32923	8.26052	0.19416	n9.79596	0.50109	9.3010	0.391	+3.1702	3.62
19	5	C.	9.43045	8.46296		n9.62889	9.94096	9.9031	0.181	+0.8729	3.91

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

MARS I.

Equatorial, Cambridge.

N°.	Date.	Wash. M.T.	Obs'd r.	2τ.	$\frac{1}{2}D_t\delta_o$.	$\mp\tau D\delta$.	r_o.	n.	log. e.	log. s.	log. n.	p.
			″		″	″	″	″				
1	1849.—Nov. 14	.6120	9.12	2.258	+ 0.665	+ 1.50	7.22	−0.40	0.18972	0.40617	n9.6021	2.44
4,5	16	.4398	6.80	1.107	0.683	− 0.74	7.31	0.32	0.19507	0.40942	n9.5051	2.67
6	21	.4538	9.81	1.346	0.714	+ 0.96	7.54	1.22	0.20855	0.41770	n0.0864	3.43
7		.7416	8.16	0.911	0.715	0.65	7.55	0.03	0.20926	0.41814	n8.4771	3.13
9	30	.7431	9.06	0.774	0.670	0.52	7.88	0.73	0.22754	0.42953	n9.8633	1.54
10	Dec. 11	.2979	9.60	0.816	+ 0.430	+ 0.35	8.03	2.00	0.23611	0 43494	n0.3010	2.57
13,14	28	.3457	7.76	0.674	− 0.080	− 0.05	7.65	0.12	0.21427	0.42125	n9.0792	3.00
19	1850.—Jan. 5	.3886	8.60	1.854	− 0.201	− 0.37	7.23	−1.02	0.19043	0.40660	n0.0086	3.00

FORMATION OF EQUATIONS.

MARS I.

Meridian, Athens.

N°.	Date.	Limb.	log. b.	log c.	log. e.	log. g.	log. s.	log. n.	k^2.	s.
1	1849.—Nov. 22	S.	n0.28654	0.17514	n0.21066	n9.54970	n0.38321	1.11727	+0.126	—2.4166
2	23	N.	n0.27521	0.15248	0.21303	n9.55015	0.44937	0.91908	0.126	+2.8143
3	25	N.	n0.25161	0.10528	0.21749	n9.55073	0.44467	0.94939	0.126	+2.7840
4	26	S.	n0.23931	0.08068	n0.21958	n9.55077	n0.40557	1.12057	0.126	—2.5443
5	28	S.	n0.21363	0.02932	n0.22343	n9.55080	n0.41394	1.13033	0.126	—2.5938
6	29	N.	n0.20019	0.00244	0.22518	n9.55073	0.43840	0.90849	0.126	+2.7441
7	30	S.	n0.18633	9.97472	n0.22683	n9.55041	n0.42052	0.97313	0.126	—2.6334
8	Dec. 4	S.	n0.12597	9.85400	n0.23215	n9.54841	n0.42849	1.07188	0.125	—2.6822
9	9	N.	n0.03642	9.67490	0.23571	n9.54403	0.44031	0.93952	0.123	+2.7562
10	14	S.	n9.92348	9.44902	n0.23553	n9.53779	n0.41868	1.09691	0.119	—2 6223
11	15	N.	n9.89689	9.39584	0.23502	n9.53629	0.45244	0.91381	0.118	+2.8343
12	16	S.	n9.86855	9.33916	n0.23436	n9.53483	n0.41135	1.07188	0.117	—2.5784
13	17	N.	n9.83825	9.27856	0.23355	n9.53328	0.45812	0.89209	0.117	+2.8716
14	19	N.	n9.77044	9.14294	0.23144	n9.52992	0.46459	0.90309	0.115	+2.9147
15	21	N.	n9.69005	8.98216	0.22872	n9.52639	0.47179	0.84510	0.113	+2.9634
16	22	S.	n9.64348	8.88902	n0.22714	n9.52450	n0.37736	1.00860	0.112	—2.3843
17	23	N.	n9.59131	8.78468	0.22541	n9.52259	0.47972	0.90849	0.111	+3.0180
18	24	S.	n9.53201	8.66608	n0.22354	n9.52059	n0.36150	1.02119	0.110	—2.2988
19	28	S.	n9.14977	7.90160	n0.21469	n9.51212	n0.32177	1.01284	0.106	—2.0978
20	29	N.	n8.96078	7.52362	0.21216	n9.50983	0.50763	0.80618	0.105	+3.2183
21	1850.—Jan. 1	N.	8.76407	7.13020	0.20384	n9.50264	0.52378	0.83251	0.101	+3.3402
22	2	S.	9.03304	7.66814	n0.20084	n9.50014	n0.25327	0.96379	0.100	—1.7917
23	3	N.	9.19790	7.99786	0.19774	n9.49753	0.53529	0.46240	0.099	+3.4300
24	5	N.	9.41056	8.42318	0.19124	n9.49214	0.54734	0.41497	0.096	+3.5265
25	6	S.	9.48742	8.57690	n0.18785	n9.48937	n0.17751	0.83251	0.095	—1.5049
26	8	S.	9.60944	8.82094	n0.18081	n9.48356	n0.12933	0.86923	0.093	—1.3478
27	10	S.	9.70461	9 01128	n0.17345	n9.47755	n0.07266	0.91908	0.090	—1.1821
28	15	N.	9.87837	9.35880	0.15391	n9.46064	0.61497	0.53148	0.083	+4.1207
29	19	N.	9.98006	9.56218	0.13739	n9.44704	0.64466	0.17609	0.078	+4.4122
30	26	S.	0.11534	9.83274	n0.10733	n9.42018	9.64464	0.59106	0.069	+0.4412
31	27	N.	0.13163	9.86532	0.10297	n9.41618	0.70708	n0.04139	0.068	+5.0943
32	29	N.	0.16250	9.92706	0.09422	n9.40803	0.72309	9.00000	0.066	+5.2856
33	Feb. 1	S.	0.20505	0.01216	n0.08107	n9.39560	0.07119	0.38021	0.062	+1.1781
34	2	S.	0.21835	0.03876	n0.07669	n9.39139	0.11638	0.74036	0.061	+1.3073
35	3	N.	0.23126	0.06458	0.07231	n9.38719	0.76349	n0.00000	0.060	+5.8008
36	4	S.	0.24380	0.08966	n0.06794	n9.38294	0.19634	0.55630	0.058	+1.5716
37	5	N.	0 25599	0.11404	0.06357	n9.37875	0.77972	n0.14613	0.057	+6.0217
38	10	S.	0.31226	0.22658	n0.04186	n9.35728	0.38173	9.77815	+0.052	+2.4084

FORMATION OF EQUATIONS OF CONDITION.

MARS II.

Equatorial, Santiago.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. f.	log. g.	log. s.	log. n.	k^2.	s.	p.
1	1851.—Dec. 16	N. S.	n0.35634	0.31474		9.97918	9.99454	0.43667	0.6628	+ 0.975	+ 2.7332	4.60
2		N. S.	n0.35593	0.31392		0.00788	0.00468	0.45037	0.7634	1.022	2.8208	1.99
3	19	N. S.	n0.32685	0.25576		0.07199	0.00227	0.45712	0.7559	1.011	2.8650	4.24
4		N. S.	n0.32654	0.25514		0.09695	0.01213	0.47082	0.7708	1.058	2.9568	3.60
5		N. S.	n0.32636	0.25478		0.10985	0.01523	0.47733	0.7404	1.073	+ 3.0014	3.00
6	20	S.	n0.31640	0.23486	n0.11690	n0.44127	0.01031	n0.53171	0.8633	1.049	— 3.4020	4.97
7	21	S.	n0.30586	0.21378	n0.12017	n9.57875	0.01292	n0.02288	0.7924	1.061	— 1.0541	5.17
8	22	S.	n0.29505	0.19216	n0.12340	0.33021	0.01528	0.15534	0.7160	1.073	+ 1.4300	5.10
9	24	S.	n0.27228	0.14662	n0.12982	n9.38952	0.02938	n9.99734	0.7853	1.145	— 0.9939	5.09
10	25	S.	n0.26054	0.12314	n0.13289	0.42991	0.03343	0.28303	0.7324	1.167	+ 1.9188	4.90
11	26	S.	n0.24884	0.07974	n0.13584	n0.22254	0.02738	n0.39563	0.8513	1.134	— 2.4867	4.88
12		S.	n0.24829	0.09864	n0.13597	n0.18518	0.04009	n0.36528	0.8692	1.203	— 2.3189	4.17
13	27	S.	n0.23631	0.07468	n0.13882	0.18589	0.03526	9.84924	0.8976	1.177	+ 0.7067	4.91
14	28	N. S.	n0.22343	0.04892		n9.99007	0.04193	9.75618	0.7853	1.213	0.5704	4.91
15	29	N. S.	n0.21054	0.02314		9.44122	0.03893	0.25548	0.7324	1.197	1.8009	4.15
16	30	N. S.	n0.19695	9.99596		0.58293	0.04354	0.72835	0.5682	1.222	+ 5.3500	4.24
17	31	N. S.	n0.18303	9.96812		n0.35732	0.05528	n9.86694	0.6434	1.290	— 0.7361	4.57
18	1852.—Jan. 1	N. S.	n0.16834	9.93874		n0.05553	0.05449	9.59351	0.6532	1.285	+ 0.3922	4.64
19	2	N. S.	n0.15361	9.90928		n9.17493	0.05288	0.13580	0.8451	1.276	1.3671	4.89
20	4	N. S.	n0.12210	9.84626		0.17722	0.05889	0.48093	0.5682	1.311	+ 3.0264	4.46
21	5	N. S.	n0.10529	9.81264		n0.28391	0.06491	n9.58692		1.348	— 0.3863	4.50
22	6	N. S.	n0.08778	9.77762		n9.78154	0.07072	9.97653	0.7482	1.385	+ 0.9474	4.30
23	7	N. S.	n0.06986	9.74178		n9.39980	0.07141	n9.97987	0.8921	1.389	— 0.9547	4.46
24	8	N. S.	n0.05173	9.70552		0.19805	0.05845	0.49178	0.8195	1.309	+ 3.1030	3.91
25		N. S.	n0.05075	9.70356		0.25607	0.07768	0.52897	0.7853	1.430	3.3804	4.14
26	9	N. S.	n0.03139	9.66484		n9.64444	0.07573	0.05565	0.8388	1.418	1.1367	4.66
27	10	N. S.	n0.01071	9.62348		n9.79134	0.07912	9.98967	0.7482	1.440	0.9765	4.86
28	11	N. S.	n9.98856	9.57918		8.53782	0.08616	0.21997	0.7482	1.487	1.6594	3.84
29	12	N. S.	n9.96664	9.53544		9.51772	0.07824	0.28865	0.6434	1.434	1.9438	4.83
30		N. S.	n9.96563	9.53332		9.71966	0.08910	0.33638	0.6021	1.508	2.1696	3.25
31	13	N. S.	n9.94192	9.48590		9.49707	0.08864	0.29487	0.6721	1.504	+ 1.9718	4.65
32	14	N. S.	n9.91672	9.43550		n0.27875	0.08790	n9.35908	0.8261	1.499	— 0.2286	4.75
33	16	N. S.	n9.86109	9.32424		8.32838	0.08864	0.23865	0.6812	1.504	+ 1.7324	4.36
34	17	N. S.	n9.83043	9.26292		8.96614	0.08786	0.26081	0.7076	1.499	1.8231	4.34
35	20	N. S.	n9.72185	9.04576		n0.06214	0.09272	9.82491	0.6990	1.533	0.6682	4.91
36		N. S.	n9.71970	9.04146		n9.97197	0.10083	9.95875	0.6902	1.591	0.9094	4.65
37	21	N. S.	n9.67950	8.96106		0.24898	0.08674	0.55733	0.8325	1.491	3.6085	2.48
38	22	N. S.	n9.62923	8.86052		0.02007	0.10119	0.47076	0.4771	1.594	2.9564	4.55
39	23	N. S.	n9.57540	8.75286		n0.03810	0.10107	9.92978	0.6232	1.592	0.8507	4.42
40	24	N. S.	n9.51363	8.62932		n0.06153	0.10143	9.91761	0.6232	1.596	0.8272	4.96
41	25	N. S.	n9.44399	8.49004		n9.77335	0.09472	0.14713	0.3010	1.547	1.4032	4.81
42	27	N. S.	n9.24965	8.10136		n0.04859	0.09792	9.98650	0.6128	1.569	0.9694	4.50
43	28	N. S.	n9.10432	7.81070		9.21827	0.10022	0.36252	0.3222	1.587	2.3042	4.30
44	29	N. S.	n8.88627	7.37460		0.24002	0.10046	0.59369		1.589	3.9236	
45	30	N. S.	n8.42886	6.45978		0.17551	0.10006	0.57179	0.0414	1.585	3.7306	4.90
46	31	N. S.	8.35927	6.32060		n0.21772	0.09902	9.79817	9.9542	1.578	0.6283	4.42
47	Feb. 1	N. S.	8.85074	7.30354		n0.34891	0.09170	8.87448	0.0414	1.526	0.0749	4.76
48	2	N. S.	9.08847	7.77900		9.66736	0.09675	0.45378	9.6990	1.562	2.8430	4.81
49	3	N. S.	9.23924	8.08054		9.58614	0.09452	0.44935	0.1461	1.545	2.8142	4.50
50	7	N. S.	9.56918	8.74042		0.28829	0.08662	9.84776	0.1139	1.490	0.7043	4.45
51	8	N. S.	9.62318	8.84842		n9.36586	0.09152	0.39669	n9.7782	1.524	2.4928	4.51
52	9	N. S.	9.67181	8.94568		0.12662	0.07895	0.61234	n9.7782	1.439	4.0958	4.09
53		N. S.	9.67499	8.95204		0.15993	0.08039	0.62440	n9.9542	1.448	4.2111	2.70
54	10	N. S.	9.71648	9.03502		n9.79211	0.08064	0.34506	n9.6990	1.450	2.2134	4.28
55	11	N. S.	9.75598	9.11402		9.82236	0.07751	0.55143	n0.1761	+ 1.429	+ 3.5598	1.95

Equatorial, Santiago—Continued.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. f.	log. g.	log. s.	log. n.	k^2.	s.	p.
56	1852.—Feb. 11	N. S.	9.75793	9.11792		9.86064	0.07586	0.55875	n0.1461	+1.417	+ 3.6203	3.22
57	13	N. S.	9.82595	9.25396		0.12067	0.07227	0.63856	n0.1761	1.395	4.3507	3.19
58		N. S.	9.82747	9.25700		0.13621	0.07132	0.64343	n0.2788	1.389	4.3998	2.61
59	14	N. S.	9.85748	9.31702		n9.96360	0.07072	0.33943	n9.7782	1.385	2.1849	4.58
60	15	N. S.	9.88566	9.37338		n9.32552	0.06246	0.46951	n0.0000	1.334	2.9479	4.58
61	16	N. S.	9.91347	9.42900		9.60692	0.06408	0.56245	n0.2553	1.344	3.6514	5.01
62	17	N. S.	9.93917	9.48040		9.94359	0.06088	0.62328	n0.3617	1.323	4.2003	5.28
63	19	N. S.	9.98606	9.57418		0.16101	0.05257	0.69205	n0.6232	1.274	4.9210	4.52
64	20	N. S.	0.00792	9.61790		0.18808	0.04982	0.70730	n0.6128	1.258	5.0969	5.01
65	21	N. S.	0.02866	9.65978		0.18258	0.04769	0.71301	n0.6232	1.246	5.1643	4.90
66	22	N. S.	0.04837	9.69880		0.14264	0.04175	0.70819	n0.6434	1.212	5.1073	3.62
67	23	N. S.	0.06728	9.73662		0.05910	0.03773	0.69457	n0.6902	1.190	4.9495	4.77
68	24	N. S.	0.08541	9.77288		9.89807	0.03385	0.67043	n0.6628	1.168	4.6820	4.77
69	25	N. S.	0.10294	9.80794		n0.11383	0.03136	0.42899	n0.5563	1.155	2.6853	4.65
70	26	N. S.	0.11973	9.84152		n0.27103	0.02805	0.34477	n0.5315	1.138	2.2119	4.65
71	27	N. S.	0.13669	9.87544		n0.40583	0.02418	0.21275	n0.7076	1.118	1.6321	4.41
72	28	N. S.	0.15120	9.90446		0.31144	0.01723	0.79989	n0.6628	1.083	6.3080	4.20
73		N. S.	0.15205	9.90616		0.30386	0.02197	0.79864	n0.7324	1.107	6.2899	4.03
74	29	N. S.	0.16615	9.93436		0.08303	0.01184	0.74540	n0.7243	1.056	5.5641	4.03
75	Mar. 1	N. S.	0.18082	9.96370		9.40773	0.01090	0.67370	n0.6812	1.052	4.7173	4.99
76	2	N. S.	0.19503	9.99212		n9.89774	0.00922	0.57751	n0.6232	1.043	3.7802	5.20
77	3	N. S.	0.20840	0.01886		n0.27717	0.00136	0.44253	n0.5315	1.006	2.7703	4.75
78	4	N. S.	0.22187	0.04580		0.40128	0.00171	0.86339	n0.8385	1.008	7.3011	4.34
79	6	N. S.	0.24725	0.09656		n9.16732	9.99479	0.68639	n0.7782	0.976	4.8572	4.40
80	7	N. S.	0.25918	0.12042		0.51424	9.98792	0.92304	n0.8751	0.946	8.3760	3.94
81	8	N. S.	0.27100	0.14406		0.24005	9.98583	0.84296	n0.8195	0.937	6.9657	4.36
82	9	N. S.	0.28239	0.16684		9.19562	9.98104	0.74025	n0.8062	0.916	5.4986	4.19
83	10	N. S.	0.29339	0.18884		n0.17447	9.97410	0.59743	n0.6090	0.888	3.9576	3.37
84	11	N. S.	0.30452	0.21110		0.25486	9.97378	0.86815	n1.0043	0.886	7.3817	4.60
85	12	N. S.	0.31480	0.23166		8.60531	9.96321	0.75803	n0.9494	0.844	5.7284	3.69
86		N. S.	0.31521	0.23248		n8.49415	9.97010	0.75410	n0.9345	0.871	5.6767	4.60
87	13	N. S.	0.32542	0.25290		n0.27402	9.96464	0.59640	n0.9243	0.850	3.9482	4.64
88	14	N. S.	0.33562	0.27330		0.26829	9.96128	0.89274	n0.9638	0.837	7.8116	4.58
89	15	N. S.	0.34550	0.29306		n9.20303	9.95710	0.77273	n0.9191	+0.821	+ 5.9255	4.82

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

MARS II.

Equatorial, Santiago.

N°.	Date.	Wash. M.T.	Obs'd r.	2τ.	$\frac{1}{2}D_t\delta_o$.	$\mp\tau D_t\delta_o$.	r_o.	n.	log. e.	log. s.	log. n.	p.
			″		″	″	″	″				
1	1851.—Dec. 16	.5671	11.84	5.655	+0.005	+ 3.41	5.91	—2.38	0.10344	0.35583	n0.3766	4.00
2		.6104	7.70	0.022	0.613	0.01	5.91	1.78	0.10353	0.35588	n0.2504	1.26
3	19	.5502	10.03	2.860	0.755	2.15	6.04	1.76	0.11354	0.36150	n0.2455	4.00
4		.5803	7.87	1.522	0.756	1.15	6.04	0.66	0.11363	0.36155	n9.8195	3.00
5		.5972	7.62	0.294	0.757	0.22	6.04	1.36	0.11369	0.36158	n0.1335	2.25
14	28	.5448	8.42	0.011	1.178	+ 0.13	6.46	1.83	0.14174	0.37766	n0.2625	4.82
15	29	.5235	6.77	0.531	1.209	— 0.64	6.50	0.93	0.14452	0.37927	n9.9685	3.86
16	30	.5236	8.58	0.607	1.254	+ 0.76	6.55	1.25	0.14727	0.38088	n0.0969	4.00
17	31	.5167	7.97	0.115	1.282	— 0.15	6.58	1.54	0.14992	0.38242	n0.1875	4.37
18	1852.—Jan. 1	.5304	8.45	0.326	1.317	+ 0.43	6.62	1.40	0.15249	0.38393	n0.1461	4.50
19	2	.5136	8.74	0.444	1.348	0.60	6.66	1.48	0.15500	0.38541	n0.1703	4.57
20	4	.5072	9.15	0.770	1.404	1.08	6.73	1.32	0.15969	0.38828	n0.1206	3.69
21	5	.5130	8.17	0.458	1.428	0.65	6.77	0.75	0.16191	0.38949	n9.8751	4.00
22	6	.5199	8.47	0.475	1.450	0.69	6.80	0.98	0.16401	0.39074	n9.9912	3.69
23	7	.5097	9.26	0.742	1.468	+ 1.09	6.83	1.32	0.16598	0.39190	n0.1206	3.69
24	8	.4700	7.07	0.616	1.483	— 0.91	6.86	1.15	0.16781	0.39299	n0.0607	3.00
25		.5204	6.70	0.577	1.484	— 0.86	6.87	0.69	0.16789	0.39304	n9.8388	3.27
26	9	.5007	8.91	0.737	1.496	+ 1.10	6.89	0.90	0.16963	0.39408	n9.9542	4.00
27	10	.5008	8.55	0.249	1.505	0.37	6.92	1.26	0.17123	0.39503	n0.1004	4.93
28	11	.5200	9.00	0.416	1.511	0.63	6.94	1.43	0.17280	0.39597	n0.1553	3.00
29	12	.4786	9.10	0.334	1.514	0.51	6.96	1.63	0.17415	0.39678	n0.2122	4.24
30		.5220	8.63	0.414	1.514	0.63	6.96	1.04	0.17420	0.39681	n0.0170	2.25
31	13	.5037	8.59	0.258	1.513	0.39	6.98	1.22	0.17542	0.39754	n0.0864	4.24
32	14	.4899	8.72	0.267	1.509	0.40	7.00	1.32	0.17654	0.39821	n0.1206	4.70
33	16	.4747	8.76	0.494	1.490	0.74	7.03	0.99	0.17835	0.39930	n9.9956	4.24
34	17	.4649	8.87	0.653	1.476	0.96	7.04	0.85	0.17906	0.39973	n9.9345	3.69
35	20	.4589	8.44	0.217	1.414	+ 0.31	7.05	1.08	0.18029	0.40046	n0.0334	4.70
36		.5112	7.99	0.182	1.412	— 0.26	7.06	1.19	0.18031	0.40048	n0.0755	4.24
37	21	.4383	9.40	0.531	1.387	+ 0.74	7.07	1.57	0.18040	0.40053	n0.1959	1.71
38	22	.4837	9.19	0.457	1.355	+ 0.62	7.07	1.50	0.18038	0.40052	n0.1761	4.33
39	23	.4763	8.97	0.533	1.322	— 0.70	7.06	1.21	0.18020	0.40041	n0.0828	4.33
40	24	.4738	9.11	0.385	1.287	+ 0.50	7.05	1.56	0.17986	0.40022	n0.1931	4.93
41	25	.4407	8.88	0.169	1.250	0.21	7.04	1.63	0.17939	0.39992	n0.2122	4.64
42	27	.4463	8.64	0.660	1.166	0.77	7.02	0.85	0.17798	0.39909	n9.9294	4.50
43	28	.4570	8.87	0.834	1.120	0.93	7.00	0.94	0.17704	0.39851	n9.9731	3.86
44	29	.4608	8.07	0.204	1.075	0.22	6.98	0.87	0.17597	0.39787	n9.9395	4.77
45	30	.4631	7.83	0.208	1.027	0.21	6.96	0.66	0.17475	0.39694	n9.8195	5.00
46	31	.4574	8.10	0.455	0.979	0.45	6.94	0.71	0.17341	0.39633	n9.8513	4.33
47	Feb. 1	.4183	7.74	0.083	0.931	0.08	6.92	0.74	0.17198	0.39549	n9.8692	4.42
48	2	.4519	8.18	0.370	0.879	0.33	6.90	0.98	0.17031	0.39448	n9.9912	4.50
49	3	.4695	7.84	0.192	0.827	0.16	6.87	0.81	0.16853	0.39342	n9.9085	4.50
50	7	.4167	7.84	0.405	0.624	0.25	6.73	0.86	0.16040	0.38860	n9.9345	4.33
51	8	.3985	7.83	0.111	0.574	0.06	6.70	1.07	0.15810	0.38724	n0.0294	4.46
52	9	.3937	7.79	0.365	0.523	+ 0.19	6.66	0.94	0.15566	0.38580	n9.9731	3.69
53		.4628	6.96	0.960	0.520	— 0.50	6.66	0.82	0.15548	0.38569	n9.9138	1.95
54	10	.4115	7.85	0.755	0.472	+ 0.36	6.62	0.87	0.15305	0.38426	n9.9395	3.86
55	11	.4027	7.53	0.101	0.423	+ 0.04	6.58	0.91	0.15041	0.38271	n9.9590	1.26
56		.4540	7.10	0.017	0.420	— 0.01	6.58	0.53	0.15027	0.38263	n9.7243	2.44
57	13	.3960	7.23	0.780	0.325	+ 0.25	6.49	0.49	0.14483	0.37945	n9.6902	2.25
58		.4430	7.48	0.665	0.323	0.21	6.49	0.78	0.14469	0.37938	n9.8921	1.71
59	14	.4049	7.30	0.672	0.277	0.19	6.45	0.66	0.14186	0.37773	n9.8195	3.86
60	15	.3705	7.55	0.501	0.232	0.12	6.40	1.03	0.13894	0.37604	n0.0128	3.86
61	16	.3871	7.43	0.303	0.186	0.06	6.36	1.01	0.13578	0.37420	n0.0043	4.50
62	17	.3859	7.03	0.262	0.141	0.04	6.32	0.67	0.13260	0.37237	n9.8261	4.97
63	19	.3683	6.83	0.004	+ 0.055	+ 0.00	6.22	—0.61	0.12609	0.36863	n9.7853	3.77

Equatorial, Santiago—Continued.

N°.	Date.	Wash. M. T.	Obs'd r.	2τ.	$\frac{1}{2}D_t\delta_o$.	$\mp\tau D_t\delta_o$.	r_o.	n.	log e.	log. s.	log. n.	p.
			″		″	″	″	″				
64	1852.—Feb. 20	.3682	6.86	0.417	+ 0.014	+ 0.01	6.17	—0.68	0.12270	0.36670	n9.8325	4.50
65	21	.3740	6.86	0.589	— 0.027	— 0.02	6.13	0.75	0.11924	0.36473	n9.8751	4.33
66	22	.3561	6.79	0.538	0.066	0.04	6.08	0.75	0.11583	0.36279	n9.8751	2.67
67	23	.3510	6.22	0.626	0.104	0.07	6.03	0.26	0.11226	0.36078	n9.4150	4.13
68	24	.3469	6.70	1.027	0.142	0.15	5.98	0.85	0.10867	0.35876	n9.9294	4.13
69	25	.3493	6.50	0.554	0.178	0.09	5.93	0.66	0.10502	0.35671	n9.8195	4.24
70	26	.3485	6.59	0.571	0.213	0.12	5.88	0.83	0.10135	0.35466	n9.9191	4.24
71	27	.3980	6.53	0.532	0.249	0.13	5.82	0.84	0.09745	0.35248	n9.9243	3.86
72	28	.3290	6.60	0.356	0.280	0.10	5.78	0.93	0.09395	0.35054	n9.9685	3.50
73		.3842	6.33	0.275	0.282	0.08	5.77	0.64	0.09375	0.35043	n9.8062	3.27
74	29	.3210	6.08	0.173	0.311	0.05	5.73	0.40	0.09020	0.34847	n9.6021	3.27
75	Mar. 1	.3288	6.24	0.266	0.343	0.09	5.68	0.65	0.08637	0.34636	n9.8129	4.75
76	2	.3370	6.37	0.151	0.373	0.05	5.63	0.79	0.08251	0.34424	n9.8976	5.14
77	3	.3171	6.21	0.251	0.402	0.10	5.58	0.73	0.07874	0.34218	n9.8633	4.33
78	4	.3347	5.89	0.457	0.431	0.20	5.53	0.56	0.07480	0.34004	n9.7482	4.13
79	6	.3411	5.90	0.426	0.487	0.21	5.43	0.68	0.06700	0.33582	n9.8325	4.24
80	7	.3246	6.06	0.437	0.514	0.22	5.38	0.90	0.06316	0.33376	n9.9542	3.50
81	8	.3274	5.86	0.474	0.540	0.26	5.33	0.79	0.05924	0.33166	n9.8976	4.24
82	9	.3192	5.90	0.082	0.565	— 0.05	5.28	0.67	0.05535	0.32959	n9.8261	3.93
83	10	.3031	6.99	0.027	0.590	+ 0.02	5.24	1.73	0.05149	0.32743	n0.2380	2.83
84	11	.3225	5.77	0.312	0.615	— 0.19	5.19	0.77	0.04748	0.32542	n9.8865	4.42
85	12	.2890	5.84	0.100	0.639	— 0.06	5.14	0.76	0.04368	0.32342	n9.8808	3.00
86		.3273	5.98	0.107	0.640	+ 0.07	5.14	0.77	0.04353	0.32334	n9.8865	4.41
87	13	.3111	5.51	0.346	0.663	— 0.23	5.09	0.65	0.03968	0.32132	n9.8129	4.50
88	14	.3157	5.64	0.279	0.687	0.19	5.05	0.78	0.03573	0.31926	n9.8921	4.33
89	15	.3128	5.57	0.238	— 0.710	— 0.17	5.00	—0.74	0.03182	0.31723	n9.8692	4.80

FORMATION OF EQUATIONS OF CONDITION.

MARS II.

Meridian, Santiago.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. g.	log. s.	log. n.	k^2.	s.
1	1851.—Dec.19	S.	n0.32615	0.25436	n0.11378	0.01665	n9.76589	0.8976	+ 1.080	— 0.5833
2	21	S.	n0.30522	0.21250	n0.12038	0.02396	n9.81351	0.8692	1.117	0.6509
3	22	S.	n0.29437	0.19080	n0.12362	0.02760	n9.83347	0.9494	1.136	0.6815
4	24	S.	n0.27180	0.14566	n0.12995	0.03478	n9.86729	0.7993	1.174	0.7367
5	25	S.	n0.26007	0.12220	n0.13303	0.03831	n9.88150	1.0128	1.193	0.7612
6	26	S.	n0.24801	0.09808	n0.13606	0.04182	n9.89409	0.9085	1.212	0.7836
7	27	S.	n0.23560	0.07326	n0.13901	0.04526	n9.90531	0.9294	1.232	0.8041
8	28	S.	n0.22389	0.04984	n0.14190	0.04865	n9.91408	0.9494	1.251	0.8205
9	30	S.	n0.19613	9.99432	n0.14745	0.05528	n9.93064	0.7709	1.290	0.8524
10	31	S.	n0.18212	9.96630	n0.15011	0.05849	n9.93671	0.6990	1.309	— 0.8644
11	1852.—Jan. 1	N.	n0.16745	9.93696	0.15268	0.06264	0.59890	n0.3424	1.334	+ 3.9710
12	2	N.	n0.15269	9.90744	0.15516	0.06471	0.59955	0.5682	1.347	3.9769
13	4	N.	n0.12112	9.84430	0.16177	0.07065	0.60259	0.3424	1.385	4.0049
14	5	N.	n0.10443	9.81092	0.16389	0.07308	0.60389	1.0212	1.400	+ 4.0169
15	6	S.	n0.08707	9.77620	n0.16422	0.07606	n9.95080	0.8195	1.419	— 0.8929
16	7	S.	n0.06899	9.74004	n0.16779	0.07865	n9.95216	0.8325	1.436	— 0.8957
17	8	N.	n0.05013	9.70232	0.16797	0.08118	0.60844	0.7404	1.453	+ 4.0592
18	9	S.	n0.03054	9.66314	n0.16972	0.08154	n9.94655	0.8261	1.456	— 0.8842
19	10	N.	n0.00976	9.62158	0.17134	0.08581	0.61256	0.7076	1.485	+ 4.0979
20	11	N.	n9.98807	9.57820	0.17285	0.08794	0.61479	0.4771	+ 1.499	+ 4.1190

Meridian, Santiago—Continued.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. g.	log. s.	log. n.	k^2.	s.
21	1852.—Jan. 12	S.	n9.96524	9.53254	n0.17423	0.08993	n9.92727	0.8129	+ 1.513	— 0.8458
22	13	N.	n9.94105	9.48436	0.17547	0.09183	0.61965	0.3424	1.526	+ 4.1653
23	14	S.	n9.91564	9.43334	n0.17658	0.09353	n9.91046	0.8388	1.539	— 0.8137
24	15	N.	n9.88754	9.37714	0.17756	0.09516	0.62486	0.4624	1.550	+ 4.2165
25	16	S.	n9.85965	9.32136	n0.17840	0.09658	n9.88829	0.3424	1.560	— 0.7732
26	17	N.	n9.82868	9.25942	0.17909	0.09790	0.63053	0.2041	1.570	+ 4.2710
27	18	S.	n9.79534	9.19274	n0.17964	0.09902	n9.86004	0.8261	1.578	— 0.7245
28	19	N.	n9.75923	9.12052	0.18005	0.10002	0.63652	0.8921	1.585	+ 4.3303
29	20	N.	n9.71984	9.04174	0.18030	0.10086	0.63964	0.0000	1.591	4.3615
30	21	N.	n9.67652	8.95510	0.18041	0.10153	0.64284	0.0000	1.596	4.3938
31	22	S.	n9.62839	8.85884	n0.18037	0.10205	n9.78017	0.9085	1.600	0.6028
32	23	N.	n9.57425	8.75056	0.18018	0.10258	0.64950	n9.8451	1.604	+ 4.4617
33	24	S.	n9.51241	8.62688	n0.17985	0.10254	n9.72411	0.1761	1.603	— 0.5298
34	25	N.	n9.44026	8 48258	0.17936	0.10256	0.65634	n9.0000	1.603	+ 4.5325
35	27	N.	n9.24545	8.09295	0.17794	0 10209	0.66349	n0.2041	1.601	+ 4.6078
36	28	S.	n9.10096	7.80398	n0.18000	0.10159	n9.56808	0.6812	1.597	— 0.3699
37	29	N.	n8.88289	7.36784	0.17595	0.10096	0.67090	0.3424	1.592	+ 4.6871
38	30	S.	n8.42415	6.45036	n0.17474	0.10015	n9.41847	n9.6021	1.586	— 0.2621
39	31	N.	8.36642	6.33490	0.17340	0.09921	0.67863	n0.1139	1.579	+ 4.7712
40	Feb. 1	S.	8.86368	7.32942	n0.17192	0.09809	n9.19618	n9.7782	1.571	— 0.1571
41	2	N.	9.08945	7.78096	0.17030	0.09682	0.68652	n0.1761	1.562	+ 4.8587
42	3	S.	9.23724	8.07654	n0.16856	0.09539	n8.64345	n0.7076	1.551	— 0.0440
43	4	N.	9.34731	8.29668	0.16669	0.09383	0.69473	9.0000	1.541	+ 4.9514
44	7	S.	9.57046	8.74298	n0.16036	0.08829	9.31387	0.1461	1.502	0.2060
45	8	S.	9.62506	8.85218	n0.15802	0.08618	9.43696	n9.0000	1.487	0.2735
46	9	N.	9.67355	8.94916	0.15557	0.08395	0.71640	n0.0414	1.472	5.2047
47	10	S.	9.71716	9.03638	n0.15300	0.08154	9.61731	n9.6990	1.455	0.4143
48	11	N.	9.75680	9.11566	0.15036	0.07910	0.72552	n0.3617	1.440	5.3152
49	13	N.	9.82663	9.25532	0.14477	0.07378	0.73494	n9.3010	1.405	5.4317
50	14	N.	9.85776	9.31758	0.14183	0.07096	0.75975	9.0000	1.387	5.4922
51	15	N.	9.88678	9.37562	0.13884	0.06806	0.74464	n0.1461	1.368	5.5544
52	16	S.	9.91399	9.43004	n0.13572	0.06501	9.94655	n0.4914	1.349	0.8842
53	17	N.	9.93961	9.48128	0.13255	0.06191	0.75459	n0.5798	1.329	5.6832
54	18	S.	9.96379	9.52964	n0.12930	0.05869	0.02386	n0.4150	1.310	1.0565
55	19	N.	9.98670	9.57546	0.12601	0.05541	0.76483	n0.8751	1.290	5.8187
56	20	S.	0.00847	9.61900	n0.12261	0.05214	0.09237	n0.6335	1.272	1.2370
57	21	N.	0.02919	9.66044	0.11918	0.04862	0.77534	n0.7243	1.251	5.9613
58	22	N.	0.04897	9.70000	0.11569	0.04512	0.78070	n0.7076	1.231	6.0353
59	23	N.	0.06789	9.73784	0.11215	0.04153	0.78610	n0.6233	1.211	6.1109
60	24	S.	0.08602	9.77410	n0.10856	0.03788	0.20968	n0.3617	1.191	1.6206
61	25	N.	0.10343	9.80892	0.10492	0.03422	0.79714	n0.9294	1.170	6.2682
62	26	S.	0.12016	9.84238	n0.10112	0.03045	0.26119	n0.6335	1.151	1.8247
63	27	N.	0.13627	9.87460	0.09754	0.02667	0.80840	n0.7993	1.131	6.4329
64	28	S.	0.15182	9.90570	n0.09382	0.02281	0.30870	n0.5563	1.111	2.0361
65	29	N.	0.16682	9.93570	0.09003	0.01896	0.81991	n1.1461	1.091	6.6056
66	Mar. 1	N.	0.18132	9.96470	0.08623	0.01502	0.82574	n0.3802	1.072	6.6948
67	2	N.	0.19536	9.99278	0.08242	0.01103	0.83162	n1.0792	1.052	6.7862
68	3	N.	0.20895	0.01996	0.07858	0.00709	0.83757	n0.9031	1.033	6.8797
69	4	N.	0.22213	0.04632	0.07472	0.00307	0.84355	n0.8513	1.014	6.9752
70	6	N.	0.24736	0.09678	0.06697	9.99498	0.85566	n0.9294	0.977	7.1723
71	7	S.	0.25943	0.12092	n0.06307	9.99087	0.47148	n0.5185	0.959	2.9613
72	8	N.	0.27119	0.14444	0.05917	9.98680	0.86793	n0.9294	0.941	7.3779
73	9	S.	0.28264	0.16734	n0.05526	9.98266	0.50683	n0.8129	0.923	3.2124
74	10	N.	0.29379	0.18964	0.05134	9.97854	0.88035	u0.7708	0.906	7.5918
75	11	S.	0.30467	0.21140	n0.04743	9.97438	0.54046	n0.7993	0.889	3.4711
76	12	N.	0.31528	0.23262	0.04351	9.97023	0.89289	n0.9912	0.872	7.8143
77	13	S.	0.32564	0.25334	n0.03959	9.96605	0.57264	n0.9243	0.855	3.7380
78	14	N.	0.33575	0.27356	0.03568	9.96189	0.90555	n0.9731	0.839	8.0455
79	15	S.	0.34564	0.29334	n0.03179	9.95771	0.60343	n0.8692	+ 0.823	+ 4.0126

FORMATION OF SUPPLEMENTARY EQUATIONS OF CONDITION.

MARS II.

Meridian, Santiago.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. g.	log. s.	log. n.	k^2.	s.
1	1851.—Dec. 21	S.	n0.30522	0.21250	n0.12038	0.02396	n9.81351	0.8573	+ 1.117	— 0.6509
2	22	S.	n0.29437	0.19080	n0.12362	0.02760	n9.83347	0.4914	1.136	0.6815
3	26	S.	n0.24801	0.09808	n0.13606	0.04182	n9.89409	0.8388	1.212	0.7836
4	27	S.	n0.23560	0.07326	n0.13901	0.04526	n9.90531	0.5315	1.232	0.8041
5	30	S.	n0.19613	9.99432	n0.14745	0.05528	n9.93064	0.7634	1.290	0.8524
6	31	S.	n0.18212	9.96630	n0.15011	0.05849	n9.93671	0.7160	1.309	— 0.8614
7	1852.—Jan. 1	N.	n0.16745	9.93696	0.15268	0.06264	0.59890	n0.5051	1.334	+ 3.9710
8	4	N.	n0.12112	9.84430	0.16177	0.07065	0.60259	0.5911	1.385	4.0049
9	5	N.	n0.10443	9.81092	0.16389	0.07308	0.60389	0.9243	1.400	4.0169
10	10	N.	n0.00976	9.62158	0.17134	0.08581	0.61256	0.8388	1.485	+ 4.0979
11	16	S.	n9.85965	9.32136	n0.17840	0.09658	n9.88829	0.7404	1.560	— 0.7732
12	17	N.	n9.82[illegible]68	9.25942	0.17909	0.09790	0.63053	0.6335	1.570	+ 4.2710
13	25	N.	n9.44026	8.48258	0.17936	0.10256	0 65634	n0.0[illegible]00	1.603	4.5325
14	27	N.	n9.24545	8.09296	0.17794	0.10209	0 66349	0.6021	1.601	+ 4.6078
15	Feb. 1	S.	8.86368	7.32942	n0.17192	0.09809	n9.19618	0.2041	1.571	— 0.1571
16	2	N.	9.08945	7.78096	0.17030	0.09682	0.68652	n0.0414	1.562	+ 4.8587
17	4	N.	9.34731	8.29668	0.16669	0.09383	0.69473	9.4771	1.541	4.9514
18	8	S.	9.62506	8.85218	n0.15802	0.08618	9.43696	n9.3010	1.487	0.2735
19	9	N.	9.67355	8.94916	0.15557	0.08395	0.71640	n9.4771	1 472	5.2047
20	18	S.	9.96379	9.52964	n0.12930	0.05869	0.02386	9.6021	1.310	1.0565
21	19	N.	9.98670	9.57546	0.12601	0.05541	0.76483	n0.4914	1.290	5.8187
22	20	S.	0.00847	9.61900	n0.12261	0.05214	0.09237	n0.5563	1.272	1.2370
23	21	N.	0.02919	9.66044	0.11918	0.04862	0.77534	n0.9294	1.251	5.9613
24	Mar. 12	N.	0.31528	0.23262	0.01351	9.97023	0.89289	n1.0086	0.872	7.8143
25	13	S.	0.32564	0.25334	n0.03959	9.96605	0.57264	n0.9191	0.855	3.7380
26	14	N.	0.33575	0.27356	0.03568	9.96189	0.90555	n0.9138	0.839	8.0455
27	15	S.	0.34564	0.29334	n0.03179	9.95771	0.60343	n0.9031	+ 0.823	+ 4.0126

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

(FROM DIRECT MEASUREMENT OF DIAMETERS.)

MARS II.

Meridian, Santiago.

N°.	Date.	Wash. M. T.	Obs'd r.	r_0.	n.	log. e.	log. s.	log. n.
			$''$	$''$	$''$			
37	1852.—January 29	.4727	8.10	6.99	— 1.11	0.17595	0.39785	n0.0453
38	30	.4689	7.95	6.97	0.98	0.17474	0.39712	n9.9912
39	31	.4650	7.55	6.95	0.60	0.17340	0.39632	n9.7782
47	Febru'y 10	.4278	7.00	6.62	— 0.38	0.15300	0.38422	n9.5798

FORMATION OF EQUATIONS OF CONDITION.

MARS II.

Equatorial, Washington.

N°.	Date.	Limb.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.	p.
1	1852.—Jan. 24	N.S.	n9.51690	8.63586	n9.66275	9.40552	0.2041	+0.212	+0.2544	3.92
2	26	N.S.	n9.36013	8.32232	n9.65705	9.52866		0.206	0.3378	
3	30	N.S.	n8.43862	6.47930	n9.58689	9.76827		0.149	0.5865	
4	Feb. 2	N.S.	9.08058	7.76322	n9.61374	9.85449	9.9542	0.169	0.7153	4.31
5	3	N.S.	9.23160	8.06526	n9.59986	9.89437	0.2304	0.158	+0.7841	4.15

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

MARS II.

Equatorial, Washington.

N°.	Date.	Wash. M.T.	Obs'd r.	2τ.	$\frac{1}{2}D_t\delta_0$.	$\mp\tau D_t\delta_0$.	r_0.	n.	log. e.	log. s.	log. n.	p.
			$''$		$''$	$''$	$''$	$''$				
1	1852.—Jan. 24	.4245	10.17	0.220	+ 1.288	+ 0.28	7.06	—2.78	0.18003	0.40031	n0.4440	3.14
2	26	.4169	9.64	0.260	1.209	0.31	7.04	2.24	0.17905	0.39972	n0.3502	3.86
3	30	.4509	9.57	0.239	1.027	0.25	6.97	2.33	0.17533	0.39749	n0.3674	2.67
4	Feb. 2	.4077	9.53	0.077	0.881	0.07	6.91	2.51	0.17039	0.39453	n0.3997	3.69
5	3	.4090	9.74	0.299	+ 0.830	+ 0.25	6.88	—2.58	0.16864	0.39348	n0.4116	3.86

FORMATION OF EQUATIONS OF CONDITION.

MARS II.

Meridian, Greenwich.

(OBSERVED CENTER, OR BOTH LIMBS.)

N°.	Date.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.
1	1851.—Dec. 8	n0.42772	0.45750	n9.79580	9.75220	n9.30103	+0.3905	+0.5652
2	26	n0.25040	0.10286	n9.84487	n9.32695	0.74819	0.4895	—0.2123
3	1852.—Jan. 5	n0.10775	9.81756	n9.85804	n9.53882	0.81954	0.5201	0.3458
4	7	n0.07260	9.74726	n9.85916	n9.53920	0.77815	0.5228	0.3461
5	9	n0.03435	9.67076	n9.85961	n9.52840	0.86923	0.5239	0.3376
6	20	n9.72785	9.05776	n9.85241	n9.12090	0.57978	0.5068	0.1321
7	22	n9.63826	8.87858	n9.84938	n8.82020	0.62325	0.4998	0.0661
8	23	n9.58541	8.77288	n9.84770	n8.47567	0.76343	0.4959	—0.0299
9	28	n9.13333	7.86872	n9.83752	9.26387	0.59106	0.4732	+0.1836
10	29	n8.93513	7.47232	n9.83517	9.36680	0.41497	0.4681	0.2327
11	30	n8.56015	6.72236	n9.83274	9.45301	0.39794	0.4629	0.2838
12	Feb. 3	9.21196	8.02598	n9.82220	9.70706	9.95424	0.4410	0.5094
13	6	9.49464	8.59134	n9.81355	9.84528	9.30103	0.4237	0.7003
14	9	9.66445	8.93096	n9.80438	9.95890	n9.60206	0.4062	0.9097
15	10	9.70895	9.01996	n9.80124	9.99277	n9.47712	0.4004	0.9835
16	11	9.74930	9.10066	n9.79805	0.02507	n9.95424	0.3945	1.0594
17	14	9.85182	9.30570	n9.78827	0.11361	n0.32222	0.3772	1.2990
18	18	9.95915	9.52036	n9.77484	0.21648	n0.20412	0.3546	1.6462
19	20	0.00428	9.61062	n9.76802	0.26286	n0.65321	0.3436	1.8317
20	26	0.11693	9.83592	n9.74742	0.38657	n0.74819	0.3125	2.4354
21	28	0.14881	9.89968	n9.74057	0.42359	n0.72428	0.3028	2.6521
22	Mar. 2	0.19264	9.98734	n9.73038	0.47596	n0.73239	0.2889	2.9920
23	3	0.20632	0.01470	n9.72701	0.49263	n0.70757	0.2845	3.1091
24	4	0.21957	0.04120	n9.72365	0.50900	n0.80618	0.2801	3.2283
25	5	0.23245	0.06696	n9.72033	0.52496	n0.72428	0.2758	3.3493
26	6	0.24495	0.09196	n9.71701	0.54062	n0.85126	0.2717	3.4723
27	8	0.26892	0.13999	n9.71045	0.57102	n0.86923	0.2636	3.7241
28	9	0.28042	0.16290	n9.70719	0.58578	n0.82607	0.2602	3.8528
29	12	0.31322	0.22850	n9.69757	0.62848	n0.86332	0.2484	4.2509
30	17	0.36292	0.32790	n9.68217	0.69486	n0.90849	0.2314	4.9529
31	18	0.37222	0.31650	n9.67918	0.70751	n0.98677	0.2282	5.0992
32	20	0.39023	0.38252	n9.67331	0.73229	n0.94448	0.2221	5.3975
33	22	0.40752	0.41710	n9.66780	0.75612	n0.91908	0.2166	5.7032
34	23	0.41592	0.43390	n9.66477	0.76785	n0.88649	0.2136	5.8594
35	25	0.43224	0.46654	n9.65924	0.79078	n0.95904	0.2082	6.1770
36	27	0.44796	0.49798	n9.65389	0.81306	n0.99564	0.2031	+6.5021

FORMATION OF EQUATIONS OF CONDITION.

MARS II.

Meridian, Cape of Good Hope.

(OBSERVED CENTER.)

N°.	Date.		log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.
1	1851—Dec.	22	n0.29707	0.19620	0.02949	0.21998	0.60959	1.15	+1.6595
2		26	n0.25102	0.10410	0.04369	0.20252	0.57634	1.22	1.5941
3		29	n0.21298	0.02802	0.05389	0.19474	0.54654	1.28	1.5658
4		30	n0.19951	0.00108	0.05717	0.19318	0.60206	1.30	1.5602
5	1852—Jan.	1	n0.17127	9.94460	0.06354	0.19153	0.65225	1.34	1.5543
6		2	n0.15644	9.91494	0.06661	0.19151	0.63043	1.36	1.5542
7		3	n0.14107	9.88420	0.06959	0.19195	0.47276	1.38	1.5558
8		5	n0.10861	9.81928	0.07532	0.19451	0.50651	1.41	1.5649
9		9	n0.03537	9.67280	0.08556	0.20515	0.41830	1.48	1.6038
10		10	n0.01494	9.63194	0.08783	0.20890	0.35793	1.50	1.6177
11		12	n9.97100	9.54406	0.09200	0.21762	0.44091	1.53	1.6505
12		13	n9.94724	9.49654	0.09391	0.22259	0.52375	1.54	1.6695
13		14	n9.92210	9.44626	0.09566	9.22789	0.50651	1.55	1.6900
14		15	n9.89540	9.39286	0.09727	0.23353	0.37291	1.57	1.7121
15		16	n9.86698	9.33602	0.09875	0.23952	0.40140	1.58	1.7359
16		19	n9.76845	9.13896	0.10225	0.25921	0.30103	1.60	1.8164
17		20	n9.72992	9.06190	0.10311	0.26633	0.16732	1.61	1.8464
18		21	n9.68764	8.97734	0.10384	0.27367	0.42651	1.61	1.8779
19		22	n9.64080	8.88369	0.10435	0.28122	0.07188	1.62	1.9108
20		23	n9.58829	8.77864	0.10473	0.28899	9.86923	1.62	1.9453
21		24	n9.52855	8.65916	0.10493	0.29693	9.11394	1.62	1.9812
22		26	n9.37676	8.35558	0.10486	0.31338	9.70757	1.62	2.0577
23		27	n9.27484	8.15174	0.10456	0.32183	n9.79934	1.62	2.0981
24		29	n8.94785	7.49776	0.10351	0.33917	n9.51851	1.61	2.1836
25	Feb.	2	9.04355	7.68916	0.09950	0.37530	n0.26007	1.58	2.3730
26		3	9.20509	8.01224	0.09809	0.38455	n9.94939	1.56	2.4241
27		4	9.32257	8.24720	0.09656	0.39391	n0.10380	1.56	2.4769
28		5	9.41411	8.43028	0.09488	0.40324	n0.29447	1.55	2.5307
29		6	9.49108	8.58422	0.09307	0.41283	n0.25768	1.54	2.5872
30		7	9.55583	8.71372	0.09112	0.42238	n0.33646	1.52	2.6447
31		9	9.66204	8.92614	0.08682	0.44168	n0.55991	1.49	2.7649
32		10	9.70677	9.01560	0.08447	0.45139	n0.58433	1.48	2.8274
33		11	9.74732	9.09670	0.08201	0.46114	n0.62014	1.46	2.8916
34		12	9.78440	9.17086	0.07944	0.47094	n0.51455	1.44	2.9576
35		13	9.81857	9.23920	0.07675	0.48077	n0.38021	1.42	3.0253
36		14	9.85025	9.30256	0.07395	0.49063	n0.44248	1.41	3.0948
37		16	9.90742	9.41690	0.06805	0.51040	n0.60097	1.37	3.2389
38		17	9.93341	9.46888	0.06497	0.52030	n0.69548	1.35	3.3136
39		18	9.95793	9.51792	0.06179	0.53021	n0.68305	1.33	3.3901
40		19	9.98114	9.56434	0.05853	0.54014	n0.70672	1.31	3.4685
41		20	0.00318	9.60842	0.05517	0.55008	n0.81090	1.29	3.5488
42		21	0.02415	9.65036	0.05175	0.56001	n0.58883	1.27	3.6309
43		23	0.06329	9.72864	0.04470	0.57985	n0.81491	1.22	3.8006
44		24	0.08161	9.76528	0.04109	0.58977	n0.86510	1.21	3.8884
45		25	0.09919	9.80044	0.03741	0.59969	n0.87622	1.19	3.9782
46		28	0.14802	9.89810	0.02607	0.62920	n0.90526	1.13	+4.2579

FORMATION OF EQUATIONS OF CONDITION.

MARS II.

Meridian, Kremsmünster.

(OBSERVED CENTER.)

N°.	Date.		log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.
1	1852—Jan.	20	n9.72943	9.06092	n9.80011	n8.71850	0.00000	+ 0.398	− 0.0523
2		24	n9.52777	8.65760	n9.79257	8.94498	0.39794	0.385	+ 0.0881
3	Feb.	8	9.61282	8.82770	n9.75141	9.96052	9.47712	0.318	0.9131
4		9	9.66261	8.92728	n9.74818	9.99317	9.30103	0.314	0.9844
5		10	9.70728	9.01662	n9.74494	0.02441	9.47712	0.309	1.0578
6		24	0.08183	9.76572	n9.69755	0.36021	n0.36173	0.248	2.2920
7		25	0.09940	9.80086	n9.69414	0.37929	n0.76343	0.245	2.3949
8		26	0.11628	9.83462	n9.69075	0.39789	n0.25527	0.241	2.4997
9	Mar.	6	0.24446	0.09098	n9.66101	0.54786	0.43136	0.210	3.5307
10		7	0.25663	0.11532	n9.65783	0.56288	n0.88081	0.207	3.6549
11		8	0.26846	0.13898	n9.65466	0.57763	n0.54407	0.204	3.7812
12		14	0.33340	0.26886	n9.63630	0.66079	n1.03743	0.187	4.5792
13		16	0.35305	0.30816	n9.63042	0.68669	n0.88081	+ 0.182	+ 4.8606

FORMATION OF EQUATIONS OF CONDITION.

VENUS I.

Equatorial, Santiago.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. f.	log. g.	log. s.	log. n.	k^2.	s.	p.
1	1850.—Oct. 19	N.	n0.45226	0.50658	0.24506	n0.36914	9.91385	0.41766	0.5911	+0.673	+2.6161	5.02
2	20	N.	n0.44462	0.49130	0.25080	n0.11035	9.89115	0.55467	0.4624	0.606	3.5865	5.13
3	22	N.	n0.42872	0.45950	0.26264	0.23558	9.90385	0.81619	0.2788	0.642	6.5493	5.20
4	23	N.	n0.42059	0.44324	0.26862	n0.45801	9.90074	0.28377	0.6021	0.633	1.9221	5.29
5	24	N.	n0.41237	0.42680	0.27461	n0.02861	9.87639	0.56272	0.5563	0.566	3.6536	5.26
6	25	N.	n0.40372	0.40950	0.28077	0.23646	9.94802	0.81649	0.1761	0.787	6.5537	5.04
7	26	N.	n0.39521	0.39248	0.28696	0.27582	9.89323	0.81888	0.6021	0.612	6.5899	5.15
8	29	N.	n0.36838	0.33882	0.30578	0.77572	9.85101	1.02302	n0.1139	0.504	10.5444	3.10
9		N.	n0.36782	0.33770	0.30617	0.75834	0.00090	1.02539	n0.0000	1.004	10.6020	3.48
10	20	N.	n0.35864	0.31934	0.31246	0.53606	9.95368	0.91332	n9.6990	0.808	8.1906	3.75
11	31	N.	n0.34900	0.30006	0.31899	9.45834	9.96579	0.70396	0.0792	0.854	5.0578	3.38
12	Nov. 1	N.	n0.33931	0.28068	0.32546	0.52297	9.93619	0.90510	0.0000	0.745	8.0372	4.99
13	2	N.	n0.32916	0.26038	0.33210	0.28396	9.96853	0.82535	0.0000	0.865	6.6888	5.13
14	4	N.	n0.30856	0.21918	0.34545	8.67761	9.92514	0.67451	0.1461	0.708	4.7262	4.39
15	6	N.	n0.28655	0.17516	0.35922	0.24289	9.97340	0.81552	9.9542	0.885	6.5391	4.78
16	7	N.	n0.27520	0.15246	0.36613	0.27421	9.97844	0.82551	n0.0792	0.905	6.6913	4.72
17	8	N.	n0.26356	0.12918	0.37308	0.35740	9.98672	0.85248	n9.6990	0.941	7.1197	4.75
18	10	N.	n0.23955	0.08116	0.38699	n0.16224	9.92688	0.51843	9.0000	0.714	3.2994	1.66
19	11	N.	n0.22639	0.05484	0.39435	n9.09061	0.03273	0.68885	9.6021	1.163	4.8849	4.95
20	13	N.	n0.19984	0.00174	0.40866	0.33949	0.02824	0.85940	n9.4771	1.139	7.2346	4.98
21	14	N.	n0.18590	9.97386	0.41587	0.08486	0.06303	0.80515	0.0792	1.337	6.3848	5.05
22	15	N.	n0.17200	9.94606	0.42285	9.21139	9.98703	0.71418	n9.0000	0.942	5.1782	3.06
23		N.	n0.17154	9.94514	0.42308	9.40243	0.06865	0.73797	9.3010	1.372	5.4697	4.44
24	16	N.	n0.15674	9.91554	0.43026	n0.16741	0.06661	0.57717	0.1461	1.359	3.7772	4.79
25	17	N.	n0.14158	9.88522	0.43739	0.15851	0.04133	0.82350	n9.8451	1.210	6.6605	4.40
26	18	N.	n0.12533	9.85272	0.44474	0.25924	0.09638	0.85898	0.0792	1.559	7.2273	4.69
27	21	N.	n0.07387	9.74980	0.46613	n8.84261	0.09161	0.73774	0.1761	1.525	5.4669	5.20
28	24	N.	n0.01487	9.63180	0.48724	9.54432	0.15911	0.79637	9.8451	2.081	6.2570	2.61
29	25	N.	n9.99326	9.58858	0.49410	8.97081	0.18257	0.78809	n9.6021	2.318	6.1389	4.17
30	26	N.	n9.97003	9.54212	0.50099	0.42493	0.24616	0.95460	9.6990	3.107	9.0075	3.12
31	28	N.	n9.92158	9.44522	0.51360	0.34820	0.21362	0.93314	n0.0792	2.674	8.5733	4.13
32	29	N.	n9.89453	9.39112	0.52010	0.44737	0.24244	0.96955	0.5315	3.054	9.3228	1.64
33	30	N.	n9.86609	9.33424	0.52613	0.02551	0.24467	0.88404	n9.8451	3.085	+7.6567	4.35
34	Dec. 3	S.	n9.76708	9.13622	n0.54287	0.20978	0.27371	n9.64286	9.8451	3.527	−0.4394	3.82
35	1851.—Jan. 6	S.	0.05510	9.71226	n0.48344	n0.26465	0.18047	n0.23484	0.8325	2.295	−1.7173	3.61
36	7	S.	0.07382	9.74970	n0.47643	9.19507	0.17018	9.58939	0.8195	2.190	+0.3885	3.61
37	8	S.	0.09106	9.78418	n0.46963	0.24339	0.15789	0.31865	n0.2304	2.069	2.0828	3.91
38	9	S.	0.10827	9.81860	n0.46251	0.46683	0.15175	0.53006	n0.3617	2.011	3.3889	4.31
39	10	S.	0.12479	9.85164	n0.45537	0.57124	0.14853	0.63587	n0.4472	1.982	4.3238	4.75
40	11	S.	0.14056	9.88318	n0.44824	0.61711	0.15859	0.69206	n0.6335	2.076	4.9211	4.13
41	12	S.	0.15621	9.91448	n0.44089	0.62390	0.12823	0.70279	n0.6532	1.805	5.0441	5.11
42	14	S.	0.18558	9.97322	n0.42634	0.52292	0.10123	0.64350	n0.2304	1.594	4.4005	5.31
43	15	S.	0.19946	0.00098	n0.41911	9.99034	0.09731	0.34033	n0.7404	1.565	2.1894	5.13
44	16	S.	0.20295	0.02796	n0.41188	n9.22737	0.09001	0.05771	n0.4914	1.514	+1.1421	5.00
45	17	S.	0.22605	0.05416	n0.40465	n0.18808	0.08043	n8.79099	n0.3424	1.449	−0.0618	4.74
46	18	S.	0.23866	0.07938	n0.39751	0.24180	0.08232	0.53011	n0.6532	1.461	+3.3893	4.47
47	20	S.	0.26303	0.12812	n0.38322	n9.77909	0.06417	0.11949	n0.5185	1.344	1.3167	4.87
48	24	S.	0.30803	0.21812	n0.35515	0.24241	0.02619	0.62625	n0.6532	1.128	+4.2291	4.43
49	26	S.	0.32890	0.25986	n0.34144	n0.52856	0.00847	n9.77866	n0.4150	1.040	−0.6007	4.96
50	27	S.	0.33896	0.27998	n0.33467	0.22290	9.99928	0.66238	n0.6721	0.997	+4.5960	4.31
51	28	S.	0.34881	0.29968	n0.32796	n9.99269	9.98932	0.32033	n0.5682	0.952	2.0909	4.71
52	Feb. 5	S.	0.42038	0.44282	n0.27670	9.68726	9.92999	0.68588	n0.5052	0.724	4.8516	5.15
53		N.	0.42045	0.44296	0.27665	9.91190	9.91705	1.03900	n0.7243	0.682	10.9394	4.98
54	6	N. S.	0.42864	0.45934	—	0.08575	9.90467	0.93369	n0.6721	0.645	8.5840	5.12
55	7	N. S.	0.43660	0.47526	—	n9.86297	9.91007	0.83273	n0.3617	0.661	6.8035	4.69
56	10	N. S.	0.45984	0.52174	—	n9.29710	9.88174	0.89048	n0.6990	+0.580	+7.7710	4.79

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

VENUS I.

Equatorial, Santiago.

N°.	Date.	Wash. M.T.	Obs'd r.	2τ.	$\frac{1}{2}D_t\delta_0$.	$\mp\tau D_t\delta_0$.	r_0.	n.	log. e.	log. s.	log. n.	p.
			$''$		$''$	$''$	$''$	$''$				
54	1851.—Feb. 6	.6627	17.03	0.439	—0.700	—0.31	16.15	—1.32	0.27052	0.45701	n0.1206	5.00
55	7	.6551	16.17	0.603	0.653	—0.39	15.92	—0.69	0.26451	0.45312	n9.8388	4.24
56	10	.6604	15 94	1.049	—0.488	—0.51	15.29	—1.25	0.24672	0.44168	n0.0969	4.24

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

VENUS I.

Equatorial, Santiago.

(FROM DIRECT MEASUREMENT OF DIAMETERS)

N°.	Date.	Wash. M.T.	Obs'd r.	N°. Obs.	r_0.	n.	log. e.	log. s.	log. n.	p.
			$''$		$''$	$''$				
	1850.—Nov. 15	.2796	23.69	5	22.94	— 0.75	0.42284	0.56199	n9.8751	3.00
	19	.3080	23.17	4	24.53	+ 1.36	0.45194	0.58332	0.1319	2.68
	Dec. 5	.3007	31.55	10	30.93	— 0.62	0.55272	0.65996	n9.7959	4.00
48	1851.—Jan. 24	.6925	20.06	10	19.62	— 0.44	0.35486	0.51374	n9.6484	4.00
49	26	.7000	19.88	10	19.00	— 0.88	0.34111	0.50425	n9.9445	4.00
50	27	.7050	19.04	10	18.71	— 0.33	0.33431	0.49959	n9.5185	4.00
51	28	.6885	18.90	10	18.43	— 0.47	0.32771	0.49509	n9.6721	4.00
52,53	Feb. 5	.7020	17.06	10	16.37	— 0.70	0.27639	0.46085	n9.8420	4.00
54	6	.7077	16.60	10	16.14	— 0.46	0.27024	0.45684	n9.6674	4.00
55	7	.7011	16.81	10	15.92	— 0.90	0.26424	0.45295	n9.9518	4.00
56	10	.7087	15.84	10	15.28	— 0.56	0.24644	0.44150	n9.7520	4.00

FORMATION OF EQUATIONS OF CONDITION.

VENUS I.

Meridian, Santiago.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. g.	log. s.	log. n.	k^2.	s.
1	1850.—Oct. 19	N.	n0.45409	0.51024	0.24368	9.31194	0.63852	1.11727	+ 0.042	+ 4.3503
2	20	N.	n0.44639	0.49484	0.24946	9.30937	0.63446	1.08636	0.042	4.3098
3	21	N.	n0.43855	0.47916	0.25535	9.30565	0.63057	0.77815	0.041	4.2714
4	22	N.	n0.43057	0.46320	0.26128	9.30210	0.62693	0.73239	0.040	4.2358
5	23	N.	n0.42245	0.44696	0.26727	9.29903	0.62358	0.84510	0.040	4.2032
6	24	N.	n0.41416	0.43038	0.27332	9.29646	0.62046	0.92942	0.039	4.1731
7	25	N.	n0.40571	0.41348	0.27944	9.29450	0.61763	0.80618	0.039	4.1460
8	26	N.	n0.39709	0.39624	0.28562	9.29313	0.61509		0.039	4.1218
9	27	N.	n0.38831	0.37868	0.29186	9.29235	0.61285	0.75587	0.038	4.1007
10	28	N.	n0.37934	0.36074	0.29816	9.29218	0.61091	0.84510	0.038	4.0824
11	30	N.	n0.36082	0.32370	0.31098	9.29398	0.60804	0.50515	0.039	4.0555
12	31	N.	n0.35126	0.30458	0.31746	9.29581	0.60701	0.74036	0.039	4.0459
13	Nov. 1	N.	n0.34148	0.28502	0.32401	9.29835	0.60636	0.90849	0.040	4.0399
14	2	N.	n0.33149	0.26504	0.33064	9.30179	0.60608	0.56820	0.040	4.0372
15	4	N.	n0.31077	0.22360	0.34405	9.31063	0.60646		+ 0.042	+ 4.0408

VENUS I.

Meridian, Santiago—Continued.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. g.	log. s.	log. n.	k^2.	s.
16	1850.—Nov. 5	N.	n0.30002	0.20210	0.35085	9.31623	0.60717	0.41497	+ 0.043	+ 4.0474
17	7	N.	n0.27771	0.15748	0.36461	9.32945	0.60963	0.76343	0.046	4.0704
18	8	N.	n0.26611	0.13428	0.37157	9.33718	0.61139	0.79239	0.047	4.0869
19	10	N.	n0.24195	0.08596	0.38562	9.35480	0.61593	0.68124	0.051	4.1298
20	11	N.	n0.22935	0.06076	0.39272	9.36454	0.61869	0.79934	0.054	4.1561
21	13	N.	n0.20298	0.00802	0.40700	9.38614	0.62518	0.30103	0.059	4.2187
22	14	N.	n0.18918	9.98042	0.41419	9.39776	0.62892	0.49831	0.062	4.2552
23	15	N.	n0.17492	9.95190	0.42140	9.40992	0.63290	0.88081	0.066	4.2944
24	16	N.	n0.16019	9.92244	0.42861	9.42273	0.63730	0.75587	0.070	4.3381
25	17	N.	n0.14493	9.89192	0.43584	9.43609	0.64193	0.44716	0.074	4.3846
26	18	N.	n0.12910	9.86026	0.44306	9.44991	0.64682	n9.77815	0.079	4.4342
27	19	N.	n0.11271	9.82748	0.45025	9.46401	0.65196	0.62325	0.085	4.4870
28	20	N.	n0.09566	9.79338	0.45742	9.47862	0.65733	0.51851	0.091	4.5429
29	21	N.	n0.07792	9.75790	0.46456	9.49357	0.66298	0.66276	0.097	+ 4.6023
30	23	S.	n0.04011	9.68228	n0.47865	9.52358	n0.51751	0.14613	0.111	— 3.2924
31	26	N.	n9.97644	9.55494	0.49917	9.57266	0.69387	0.41497	0.140	+ 4.9417
32	27	N.	n9.95293	9.50792	0.50577	9.58931	0.70050	0.30103	0.151	5.0177
33	28	N.	n9.92811	9.45828	0.51223	9.60587	0.70729	0.69897	0.163	5.0968
34	30	N.	n0.90189	9.40584	0.52460	9.63925	0.71926	0.47712	0.190	5.2391
35	Dec. 2	N.	n9.81165	9.22536	0.53615	9.67262	0.73458	0.49136	0.221	5.4273
36	4	N.	n9.73916	9.08038	0.54664	9.70557	0.74819	0.63347	0.258	5.6000
37	5	N.	n9.69781	8.99768	0.55145	9.72182	0.75494	0.59106	0.271	5.6878
38	8	N.	n9.54316	8.68838	0.56382	9.76895	0.77450	0.49136	0.345	5.9497
39	10	N.	n9.39742	8.39690	0.57014	9.79848	0.78678	0.75587	0.395	6.1205
40	(12)	N.	n9.17649	7.95504	0.57471	9.82605	0.79829	0.81291	0.449	+ 6.2847
41	(13)	S.	n9.00156	7.60206	n0.57622	9.83811	n0.50195	0.51851	0.474	— 3.1765
42	21	S.	9.54131	8.68468	n0.56888	9.92114	n0.39366	0.74819	0.695	2.4755
43	22	S.	9.59926	8.80058	n0.56574	9.92620	n0.37562	0.20412	0.711	2.3748
44	29	S.	9.87279	9.34764	n0.53348	9.93853	n0.19835	0.56820	0.754	1.5789
45	31	S.	9.92714	9.45634	n0.52168	9.93539	n0.12424	0.70757	0.744	1.3312
46	1851.—Jan. 5	S.	0.03942	9.68090	n0.48901	9.91822	n9.83270		0.686	0.6803
47	6	S.	0.05877	9.71960	n0.48209	9.91208	n9.73926		0.667	0.5486
48	7	S.	0.07729	9.75664	n0.47509	9.90651	n9.61690	9.60206	0.650	0.4139
49	8	S.	0.09504	9.79214	n0.46801	9.90055	n9.44436		0.633	0.2782
50	9	S.	0.11211	9.82628	n0.46087	9.89421	n9.14983	0.07918	0.614	0.1412
51	10	S.	0.12854	9.85914	n0.45376	9.88757	n7.55630	9.90309	0.596	— 0.0036
52	11	S.	0.14437	9.89080	n0.44648	9.88058	9.13354	0.38021	0.577	+ 0.1360
53	12	S.	0.15964	9.92134	n0.43925	9.87337	9.44107	n9.95424	0.558	0.2761
54	13	S.	0.17439	9.95084	n0.43200	9.86586	9.62066	9.60206	0.539	0.4175
55	14	S.	0.18866	9.97938	n0.42475	9.85812	9.74796	9.84510	0.520	0.5597
56	15	S.	0.20248	0.00702	n0.41751	9.85021	9.84720	9.47712	0.502	0.7034
57	16	S.	0.21587	0.03380	n0.41028	9.84210	9.92834	9.84510	0.483	0.8479
58	17	S.	0.22886	0.05978	n0.40307	9.83382	9.99730	9.77815	0.465	0.9938
59	20	S.	0.26567	0.13340	n0.38163	9.80829	0.15791	n0.32222	0.414	1.4385
60	21	S.	0.27728	0.15662	n0.37456	9.79958	0.20115	n0.00000	0.397	1.5891
61	22	S.	0.28858	0.17922	n0.36754	9.79084	0.24075	n9.00000	0.382	1.7408
62	23	S.	0.29961	0.20128	n0.36571	9.78720	0.27286	n0.43136	0.375	1.8744
63	24	S.	0.31035	0.22276	n0.35365	9.77323	0.31158	n0.27875	0.352	2.0492
64	25	S.	0.32084	0.24374	n0.34679	9.76442	0.34345	n0.51851	0.338	2.2052
65	26	S.	0.33108	0.26422	n0.33998	9.75557	0.37342	n9.77815	0.324	2.3628
66	27	S.	0.34109	0.28424	n0.33323	9.74679	0.40170	n0.23045	0.312	2.5217
67	28	S.	0.35087	0.30380	n0.32655	9.73805	0.42848	n9.77815	0.299	2.6821
68	Feb. 3	S.	0.40536	0.41278	n0.28781	9.68717	0.56538	0.00000	0.237	3.6760
69	5	S.	0.42210	0.44626	n0.27541	9.67111	0.60431	0.00000	0.220	4.0208
70	6	S.	0.43024	0.46254	n0.26932	9.66339	0.62277	n9.60206	0.212	4.1954
71	7	S.	0.43823	0.47852	n0.26329	9.65570	0.64066	0.27875	0.205	4.3718
72	10	S.	0.46134	0.52474	n0.24976	9.63813	0.69001	0.55630	+ 0.189	+ 4.8979

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

VENUS I.

Meridian, Santiago.

(FROM DIRECT MEASUREMENT OF DIAMETERS.)

N°.	Date.	Wash. M.T.	Obs'd r.	r_0.	n.	log. e.	log. s.	log. n.
			$''$	$''$	$''$			
1	1850.—Oct. 19	.0986	14.94	15.18	+ 0.24	0.24368	0.43975	9.3802
2	20	.0985	14.87	15.39	+ 0.52	0.24946	0.44343	9.7160
3	21	.0984	15.64	15.59	— 0.05	0.25535	0.44721	n8.6990
4	22	.0983	15.64	15.81	+ 0.17	0.26128	0.45103	9.2304
5	23	.0981	15.92	16.03	0.11	0.26727	0.45491	9.0414
6	24	.0979	15.64	16.25	0.61	0.27332	0.45885	9.7853
7	25	.0977	15.78	16.48	0.70	0.27944	0.46285	9.8451
8	26	.0975	15.78	16.72	0.94	0.28562	0.46691	9.9731
9	27	.0971	15.78	16.96	1.18	0.29186	0.47103	0.0719
11	30	.0960	16.61	17.73	1.11	0.31098	0.48377	0.0473
13	Nov. 1	.0950	16.61	18.27	+ 1.65	0.32401	0.49258	0.2188
16	5	.0924	19.69	19.43	— 0.26	0.35085	0.51097	n9.4150
17	7	.0907	19.06	20.06	+ 1.00	0.36461	0.52053	0.0000
18	8	.0898	19.83	20.38	+ 0.55	0.37157	0.52540	9.7404
19	10	.0876	21.22	21.05	— 0.17	0.38562	0.53530	n9.2430
20	11	.0865	21.36	21.40	+ 0.16	0.39272	0.54035	9.2175
21	13	.0839	21.78	22.11	0.32	0.40700	0.55056	9.5119
22	14	.0824	22.34	22.48	0.14	0.41419	0.55574	9.1461
24	16	.0793	22.76	23.24	0.48	0.42861	0.56620	9.6812
25	17	.0776	22.27	23.63	1.36	0.43584	0.57147	0.1335
26	18	.0757	23.73	24.03	0.29	0.44306	0.57676	9.4698
27	19	.0738	23.73	24.43	0.69	0.45025	0.58207	9.8420
28	20	.0717	24.29	24.84	0.54	0.45742	0.58737	9.7364
29	21	.0696	25.06	25.25	+ 0.18	0.46456	0.59267	9.2672
30	23	.0649	26.46	26.08	— 0.38	0.47865	0.60321	n9.5855
31	26	.0562	26.46	27.34	+ 0.87	0.49917	0.61870	9.9420
32	27	.0541	26.67	27.72	1.05	0.50577	0.62373	0.0212
33	28	.0511	27.16	28.18	1.02	0.51223	0.62865	0.0086
35	Dec. 2	.0379	29.74	29.77	0.03	0.53615	0.64707	8.4771
36	4	.0305	29.18	30.50	1.31	0.54664	0.65521	0.1189
37	5	.0267	30.46	30.84	0.38	0.55145	0.65896	9.5798
38	8	.0146	30.86	31.74	+ 0.88	0.56382	0.66865	9.9445
39	10	.0060	32.53	32.19	— 0.34	0.57014	0.67362	n9.5378
40	12	.9973	32.53	32.53	— 0.00	0.57471	0.67723	n7.6990
41	13	.9928	31.83	32.65	+ 0.81	0.57622	0.67842	9.9112

FORMATION OF EQUATIONS OF CONDITION.

VENUS I.

Equatorial, Washington.

(OBSERVED BOTH LIMBS.)

N°.	Date.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2	s.	p.
1	1850.—Oct. 19	n0.45285	0.50776	n0.13267	{ 8.40140	n0.1761	+1.841	+0.0252	3.23
2	21	n0.43724	0.47654	n0.14762	n9.16316 }	n0.5798	1.974	—0.1456	3.54
3	22	n0.42936	0.46078	n0.16277	n9.40329	0.5682	2.117	0.2531	3.61
4	28	n0.37795	0.35796	n0.19912	n9.83841	0.6434	2.503	0.6893	3.10
5	Nov. 1	n0.34004	0.28214	n0.23012	n9.98753	0.6021	2.887	0.9717	3.50
6	2	n0.33003	0.26212	n0.23918	n0.01870	0.5682	3.009	1.0440	4.28
7	9	n0.25243	0.10692	n0.28539	n0.15791	0.4914	3.721	1.4385	3.07
8	10	n0.24029	0.08264	n0.30309	n0.18721	9.3010	4.038	1.5389	2.78
9	13	n0.20097	0.00400	n0.31305	n0.21357	0.5563	4.227	1.6352	3.43
10	14	n0.18716	9.97638	n0.32269	n0.22889	0.2553	4.420	1.6939	3.44
11	21	n0.07520	9.75246	n0.36674	n0.29010	n9.0000	5.582	—1.9503	4.65
12	1851.—Jan. 13	0.17285	9.94776	n0.31485	0.11757	n0.9138	4.263	+1.3109	4.81
13	15	0.20084	0.00374	n0.29178	0.21450	n0.6232	3.834	1.6387	4.83
14	24	0.30913	0.22032	n0.23293	0.47549	n0.5911	+2.922	+2.9887	3.43

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

VENUS I.

Equatorial, Washington.

N°.	Date.	Wash. M.T.	Obs'd r.	$2\,\tau$.	$\frac{1}{2}\,D_t\delta_o$.	$\mp\tau D_t\delta_o$.	r_o.	n.	log. e.	log. s.	log. n.	p.
			″		″	″	″	″				
2	1850.—Oct. 21	.2638	17.57	0.290	—1.789	—0.52	15.63	—2.37	0.25633	0.44784	n0.3747	2.67
3	22	.2482	17.03	0.017	1.676	+0.03	15.84	—1.25	0.26217	0.45160	n0.1303	1.84
4	28	.2485	17.98	0.204	0.992	—0.20	17.26	—0.82	0.29913	0.47586	n9.9138	2.25
5	Nov. 1	.2415	19.25	0.500	0.552	—0.28	18.31	—1.12	0.32498	0.49324	n0.0492	2.67
6	2	.2382	20.32	0.118	—0.444	—0.05	18.59	—1.68	0.33160	0.49774	n0.2253	3.69
7	9	.2346	23.63	0.332	+0.283	+0.09	20.74	—2.68	0.37960	0.53105	n0.4281	2.25
8	10	.2362	19.83	0.221	0.385	+0.09	21.10	+1.25	0.38667	0.53605	0.0969	1.71
8		.2208	22.14	0.404	0.383	—0.16	21.10	—1.09	0.38656	0.53597	n0.0374	1.95
9	13	.2313	22.32	0.297	0.677	+0.20	22.17	+0.18	0.40806	0.55132	9.2553	2.67
10	14	.2259	22.73	0 211	0.774	+0.16	22.54	—0.90	0.41523	0.55649	n9.9542	2.67
11	21	.2188	25.07	0.030	+1.444	—0.04	25.31	+0.06	0.46562	0.59347	8.7782	4.06
12	1851.—Jan. 13	.7770	24.82	0.139	—0.159	—0.02	23.47	—1.45	0.43277	0.56923	n0.1614	4.24
13	15	.7592	24.55	0.119	—0.355	—0.04	22.70	—1.98	0.41839	0.55877	n0.2967	4.57
14	24	.7533	20.59	0.129	+0.868	—0.11	19.60	—1.18	0.35444	0.51345	n0.0719	2.67

FORMATION OF EQUATIONS OF CONDITION.

VENUS I.

Meridian, Greenwich.

N°.	Date.	Limb.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2	s.
1	1850.—Oct. 15	S.	n0.48361	0.56928	n0.20788	n9.97763	0.55991	+ 2.605	— 0.9498
2	16	C.	n0.47642	0.55490	n0.21377	n8.63043	0.63949	2.676	— 0.0427
3	21	N.	n0.43856	0.47918	n0.24384	9.71265	0.93952	3.074	+ 0.5160
4	Nov. 11	N.	n0.22905	0.06016	n0.38264	n9.98195	0.58092	5.825	— 0.9593
5	28	N.	n9.92572	9.45350	n0.49961	n0.23505	0.85248	9.982	1.7181
6	29	N.	n9.89907	9.40020	n0.50562	n0.24175	0.91968	10.262	1.7448
7	Dec. 6	N.	n9.64481	8.89168	n0.54083	n0.26423	0.83315	12.069	1.8375
8	27	C.	9.80392	9.20990	n0.51795	n0.17519	1.00432	10.862	— 1.4969
9	1851.—Jan. 8	N.	0.09162	9.78530	n0.43816	0.04230	9.64345	7.522	+ 1.1023
10	17	N.	0.22635	0.05476	n0.37348	0.39010	0.15534	5.584	2.4553
11	22	N.	0.28639	0.17484	n0.33861	0.51171	n9.74036	4.756	3.2487
12	29	N.	0.35858	0.31922	n0.29234	0.64430	n9.84510	3.843	4.4086
13	Feb. 2	N.	0.39502	0.39210	n0.26725	0.70754	n0.37291	3.424	5.0996
14	3	S.	0.40368	0.40942	n0.26149	0.51511	n0.40140	3.334	3.2742
15	5	N.	0.42049	0.44304	n0.24905	0.75069	n0.41996	3.148	5.6324
16	7	N.	0.43667	0.47540	n0.23720	0.77777	n0.14613	2.981	5.9947
17	16	S.	0.50286	0.60778	n0.18635	0.75589	n0.66464	+ 2.359	+ 5.7002

FORMATION OF EQUATIONS OF CONDITION.

VENUS I.

Meridian, Altona.

(OBSERVED CENTER.)

N°.	Date.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.
1	1851.—Jan. 27	0.33887	0.27980	n0.31094	0.48296	n9.0000	+ 4.187	+ 3.041
2	31	0.37693	0.35592	n0.28517	0.57089	n0.3802	+ 3.718	+ 3.723

FORMATION OF EQUATIONS OF CONDITION.

VENUS II

Equatorial, Santiago.

N°.	Date.	Limb.	log. b.	log. c.	log. e.	log. f.	log. g.	log. s.	log. n.	k^2	s.	p.
1	1852.—May 30	N. S.	n0.35929	0.32064		n0.33746	0.10111	n9.03180	n0.6532	+1.593	−0.1076	3.13
2	June 2	N. S.	n0.32994	0.26194		n0.45025	0.12686	n9.89790	0.1761	1.794	−0.7905	1.55
3	3	N. S.	n0.31966	0.24138		0.22223	0.13209	0.56575		1.838	+3.6792	
4	12	N. S.	n0.21424	0.03054		n0.26326	0.17892	9.04610	n0.4150	2.279	0.1112	1.45
5	15	N. S.	n0.17254	9.94714		n9.37273	0.19429	0.23702	n0.1461	2.447	1.7259	2.84
6	22	N. S.	n0.05608	9.71422		n0.14770	0.22779	9.82217	0.3010	2.855	0.6640	3.00
7	23	N. S.	n0.03646	9.67498		n9.93692	0.22713	0.08196	n0.2041	2.846	+1.2077	3.96
8	24	N. S.	n0.01608	9.63422		n0.40651	0.23395	n9.64610	n0.6990	2.937	−0.4430	2.57
9	July 6	N.	n9.64162	8.88530	0.49487	n0.01246	0.27915	0.75100	n0.3010	3.616	+5.6364	2.82
10	9	N.	n9.46004	8.52214	0.50991	n9.50461	0.28769	0.81955	n0.1139	3.762	6.6001	4.00
11	30	N. S.	9.89612	9.39430		0.32862	0.29677	0.78865	0.8261	3.921	6.1469	2.62
12	31	N. S.	9.92288	9.44782		n0.06696	0.29634	0.46679	0.6628	3.914	2.9295	2.18
13	Aug. 4	N. S.	0.01564	9.63334		n9.53567	0.27896	0.60467	0.9395	3.613	4.0241	1.84
14	8	N. S.	0.09199	9.78604		0.54521	0.25372	0.91114	0.7559	3.217	8.1497	1.50
15	12	N. S.	0.15723	9.91652		9.90244	0.24430	0.76456	0.9138	3.080	5.8152	2.90
16	13	N. S.	0.17209	9.94624		0.14554	0.24041	0.81341	0.8865	3.026	6.5074	2.57
17	16	N. S.	0.21377	0.02960		0.32141	0.22129	0.87315	0.7076	2.771	7.4670	3.20
18	21	N. S.	0.27523	0.15252		0.37526	0.17332	0.91215	0.7243	2.221	8.1686	3.02
19		N. S.	0.27548	0.15302		0.38360	0.19234	0.91825	0.7324	2.425	8.2841	3.73
20	22	N. S.	0.28676	0.17558		n0.20918	0.18127	0.63676	0.8261	2.304	4.3327	1.84
21	23	N. S.	0.29792	0.19790		n8.76193	0.18194	0.77999	0.8195	2.311	6.0254	2.34
22	28	N. S.	0.34943	0.30092		9.38578	0.15584	0.83949	0.4914	2.049	6.9101	1.41
23	Sept. 1	N. S.	0.38659	0.37524		0.26193	0.12868	0.95332	0.7559	1.809	8.9809	2.88
24	2	N. S.	0.39537	0.39280		0.20393	0.11831	0.94784	0.8573	1.721	8.8682	3.20
25	3	N. S.	0.40402	0.41010		n0.42746	0.11322	0.67471	1.0899	1.685	4.7283	1.50
26	6	N. S.	0.42895	0.45996		n9.33325	0.09292	0.88036	0.8129	1.534	7.5921	3.00
27	7	N. S.	0.43693	0.47592		n0.20828	0.08345	0.80092	0.8921	1.469	6.3230	2.82
28	8	N. S.	0.44482	0.49170		0.54732	0.07942	1.06499	0.4150	1.442	+11.6143	3.43

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

VENUS II.

Equatorial, Santiago.

N°.	Date.	Wash. M.T.	Obs'd r	2τ.	$\frac{1}{2}D_t\delta_0$.	$\mp\tau D_t\delta_0$	r_0.	n.	log. e.	log. s.	log. n.	p.
			″		″	″	″	″				
1	1852.—May 30	.2578	15.62	0.445	—2.370	+ 1.05	15.40	+0.87	0.25000	0.44378	9.9395	3.00
2	June 2	.2471	18.70	0.450	2.550	1.15	15.84	—1.64	0.26255	0.45165	n0.2227	3.50
3	3	.2460	18.08	0.682	2.602	1.77	16.07	0.18	0.27477	0.45979	n9.2553	1.71
4	12	.2456	22.13	0.573	2.902	1.66	18.69	1.73	0.33411	0.49945	n0.2380	2.67
5	15	.2442	23.24	0.974	2.929	2.86	19.61	0.67	0.35478	0.51369	n9.8261	2.25
6	22	.2431	23.79	0.366	2.834	1.04	21.96	0.75	0.40390	0.54834	n9.8751	3.00
7	23	.2484	25.94	0.508	2.801	1.42	22.32	2.13	0.41096	0.55341	n0.3284	3.27
8	24	.2456	24.47	0.699	—2.764	1.93	22.68	0.22	0.41795	0.55845	9.3424	2.25
11	July 30	.7455	31.45	0.451	+0.290	+ 0.13	28.42	2.85	0.51590	0.63146	n0.4548	1.95
12	31	.7458	29.42	0.540	0.355	— 0.19	28.13	—1.54	0.51162	0.62819	n0.1875	1.71
13	Aug. 4	.7335	25.74	0.494	0.572	— 0.28	26.88	+0.80	0.49179	0.61311	9.9031	1.36
14	8	.7182	24.54	0.980	0.707	+ 0.71	25.48	+1.76	0.46854	0.59564	0.2455	1.00
15	12	.7247	24.62	0.022	0.759	— 0.02	24.02	—0.60	0.44298	0.57671	n9.7782	2.83
16	13	.7253	25.42	1.270	0.762	+ 0.97	23.66	0.67	0.43638	0.57177	n9.8261	2.25
17	16	.7189	24.30	0.593	0.735	+ 0.44	22.60	1.20	0.41634	0.55729	n0.0792	2.67
18	21	.6923	21.98	0.024	0.600	— 0.01	20.91	—1.08	0.38265	0.53320	n0.0334	2.44
19	21	.7144	20.43	0.312	0.600	— 0.19	20.91	+0.26	0.38249	0.53309	9.4150	3.50
20	22	.7073	21.18	0.331	0.561	+ 0.19	20.59	—0.37	0.37579	0.52836	n9.5682	1.36
21	23	.7146	21.65	0.348	0.516	— 0.18	20.26	1.60	0.36901	0.52361	n0.2041	1.95
22	28	.7164	20.47	0.056	+0.242	+ 0.01	18.77	1.65	0.33577	0.50058	n0.2175	2.44
23	Sept. 1	.7104	19.12	0.605	—0.037	— 0.02	17.69	1.41	0.31002	0.48313	n0.1492	2.25
24	2	.7044	19.20	0.896	0.113	— 0.10	17.43	1.80	0.30373	0.47892	n0.2553	2.67
25	3	.7052	18.16	0.664	0.191	+ 0.13	17.18	0.90	0.29746	0.47474	n9.9542	3.00
26	6	.7010	17.16	0.392	0.441	0.17	16.47	0.55	0.27905	0.46259	n9.7404	3.00
27	7	.6962	17.90	0.529	0.529	+ 0.28	16.25	1.41	0.27305	0.45867	n0.1492	2.67
28	8	.6982	16.78	0.409	0.617	— 0.25	16.03	—0.97	0.26705	0.45476	n9.9868	4.00

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

VENUS II.

Equatorial, Santiago.

(FROM DIRECT MEASUREMENT OF DIAMETERS.)

N°.	Date.	Wash. M.T.	Obs'd r.	No. Obs.	r_0.	n.	log. e.	log. s.	log. n.	p.
			″		″	″				
	1852.—July 10	.2148	28.86	6	28.31	— 0.56	0.51428	0.63022	n9.7443	3.28
12	31	.7562	29.26	5	28.13	1.14	0.51158	0.62816	n0.0550	3.00
13	Aug. 4	.7510	28.42	6	26.87	1.56	0.49170	0.61304	n0.1917	3.28
15	12	.7460	25.05	6	24.01	1.05	0.44284	0.57660	n0.0191	3.28
16	13	.7420	25.32	6	23.65	1.67	0.43627	0.57179	n0.2227	3.28
17	16	.7400	22.94	6	22.59	0.35	0.41620	0.55719	n9.5441	3.28
18	21	.7395	21.91	6	20.89	1.02	0.38233	0.53297	n0.0107	3.28
23	Sept. 1	.7290	18.20	6	17.68	— 0.52	0.30990	0.48305	n9.7202	3.28

FORMATION OF EQUATIONS OF CONDITION.

VENUS II.

Meridian, Santiago.

N°.	Date.	Limb.	log. b.	log. c.	log e.	log. g.	log s.	log. n.	k^2.	s.
1	1852.—May 30	S.	n0.36066	0.32338	n0.24912	0.17411	n9.67228	n0.6628	+2.229	—0.4702
2	31	S.	n0.35109	0.30424	n0.25522	0.17928	n9.71458	n0.2788	2.283	—0.5183
3	June 2	N.	n0.33131	0.26468	0.26762	0.18977	0.70716	n0.6812	2.396	+5.0952
4	3	S.	n0.32107	0.24420	n0.27391	0.19499	n9.81425	n0.7634	2.455	—0.6520
5	12	N.	n0.21614	0.03434	0.33314	0.24383	0.72788	n0.4314	3.074	+5.3441
6	13	S.	n0.20275	0.00756	n0.33997	0.24942	n9.99524	n0.5051	3.154	—0.9891
7	22	N.	n0.05908	9.72022	0.40279	0.30050	0.77122	n0.0414	3.990	+5.9050
8	23	S.	n0.03974	9.68154	n0.40980	0.30612	n0.06491	n0.6721	4.095	—1.1612
9	24	N.	n0.01951	9.64108	0.41680	0.31187	0.78198	n0.2553	4.204	+6.0531
10	28	N.	n9.92761	9.45728	0.44429	0.33418	0.80484	9.6990	4.660	+6.3803
11	29	S.	n9.90124	9.40454	n0.45097	0.33952	n0.07269	n0.7782	4.775	—1.1822
12	30	N.	n9.87317	9.34840	0.45756	0.34496	0.81672	n0.1139	4.897	+6.5572
13	July 1	N.	n9.84316	9.28838	0.46401	0.35019	0.82266	n9.8451	5.016	6.6475
14	5	N.	n9.69684	8.99574	0.48826	0.36989	0.84651	0.1461	5.493	7.0229
15	6	N.	n9.65151	8.90508	0.49383	0.37441	0.85239	0.5051	5.608	7.1185
16	7	N.	n9.69980	8.80166	0.49914	0.37870	0.85813	0.4314	5.720	7.2131
17	8	N.	n9.54173	8.68552	0.50422	0.38280	0.86379	0.8195	5.829	7.3079
18	9	N.	n9.47467	8.55140	0.50900	0.38666	0.86933	0.8976	5.933	7.4017
19	10	N.	n8.39535	8.39276	0.51348	0.39026	0.87473	0.4314	6.033	7.4914
20	13	N.	n8.99625	7.59456	0.52490	0.39931	0.88995	0.3979	6.290	7.7615
21	(18)	N.	9.17516	7.95238	0.53617	0.40765	0.91127	0.7243	6.536	8.1521
22	26	N.	9.77651	9.15508	0.52896	0.39844	0.93570	0.7559	6.265	8.6238
23	29	N.	9.87338	9.34882	0.51909	0.38877	0.94065	0.9294	5.991	8.7226
24	30	N.	9.90141	9.40488	0.51510	0.38492	0.94208	1.0492	5.885	8.7513
25	31	N.	9.92773	9.45752	0.51078	0.38079	0.94342	0.6335	5.774	8.7785
26	Aug. 4	N.	0.01952	9.64110	0.49077	0.36182	0.94841	0.8633	5.292	8.8799
27	5	N.	0.03973	9.68152	0.48519	0.35657	0.94964	0.7853	5.165	8.9052
28	6	N.	0.05905	9.72016	0.47951	0.35123	0.95096	0.8692	5.040	8.9322
29	7	N.	0.07755	9.75716	0.47238	0.34446	0.95157	0.9770	4.886	8.9449
30	8	N.	0.09528	9.79262	0.46740	0.33986	0.95358	0.8808	4.783	8.9863
31	10	N.	0.12874	9.85954	0.45482	0.32806	0.95650	0.9770	4.530	9.0470
32	12	N.	0.15980	9.92166	0.44186	0.31592	0.95978	0.8751	4.283	9.1156
33	13	N.	0.17454	9.95114	0.43527	0.30973	0.96157	0.7482	4.164	9.1532
34	14	N.	0.18880	9.97966	0.42862	0.30349	0.96348	0.8129	4.046	9.1935
35	16	N.	0.21597	0.03400	0.41521	0.29087	0.96759	0.9395	3.817	9.2809
36	21	N.	0.27735	0.15676	0.38140	0.25883	0.97999	0.8129	3.294	9.4499
37	22	N.	0.28864	0.17934	0.37466	0.25240	0.98285	0.7634	3.198	9.6127
38	23	N.	0.29966	0.20138	0.36794	0.24595	0.98581	0.8865	3.104	9.6786
39	28	N.	0.35090	0.30386	0.33479	0.21379	1.00234	0.8513	2.677	10.0541
40	31	N.	0.37898	0.36002	0.31540	0.19461	1.01355	0.8062	2.450	10.3168
41	Sept. 1	N.	0.38795	0.37796	0.30904	0.18824	1.01748	0.8633	2.380	10.4106
42	2	N.	0.39676	0.39554	0.30273	0.18189	1.02149	0.6532	2.311	10.5074
43	3	N.	0.40548	0.41302	0.29649	0.17556	1.02570	0.7324	2.245	10.6094
44	6	N.	0.43024	0.46254	0.27809	0.15663	1.03843	0.8692	2.058	10.9253
45	7	N.	0.43822	0.47850	0.27206	0.15035	1.04286	0.8808	1.998	11.0371
46	8	N.	0.44606	0.49418	0.26612	0.14410	1.04736	0.7993	1.942	+11.1521

FORMATION OF ADDITIONAL EQUATIONS OF CONDITION.

VENUS II.

Meridian, Santiago.

(FROM DIRECT MEASUREMENT OF DIAMETERS.)

N°.	Date.	Wash. M.T.	Obs'd r.	r_0	n.	log. e.	log. s.	log. n.
			″	″	″			
1	1852.—May 30	.1131	15.15	15.37	+0.22	0.24912	0.44322	9.3424
2	31	.1126	16.06	15.59	—0.47	0.25522	0.44712	n9.6721
3	June 2	.1115	15.50	16.04	+0.54	0.26762	0.45513	9.7324
4	3	.1109	16.89	16.28	—0.61	0.27391	0.45923	n9.7889
5	12	.1022	18.57	18.65	+0.08	0.33314	0.49879	8.9031
6	13	.1009	18.64	18.95	0.31	0.33997	0.50347	9.4914
7	22	.0855	21.64	21.90	0.25	0.40279	0.54754	9.4065
8	23	.0833	21.92	22.26	0.33	0.40980	0.55258	9.5250
9	24	.0810	21.99	22.62	0.63	0.41680	0.55762	9.7993
10	28	.0708	21.64	24.10	2.45	0.44429	0.57767	0.3900
11	29	.0680	23.32	24.47	1.15	0.45097	0.58260	0.0607
12	30	.0651	23.60	24.85	1.25	0.45756	0.58747	0.0969
13	July 1	.0620	23.94	25.21	1.26	0.46401	0.59227	0.1021
14	5	.0488	24.57	26.67	2.09	0.48826	0.61044	0.3212
15	6	.0452	25.27	27.00	1.72	0.49383	0.61465	0.2368
16	7	.0415	25.41	27.34	1.92	0.49914	0.61868	0.2844
17	8	.0376	25.55	27.66	2.10	0.50422	0.62254	0.3232
18	9	.0337	26.74	27.97	1.23	0.50900	0.62619	0.0899
19	10	.0297	26.69	28.26	1.57	0.51348	0.62961	0.1959
20	13	.0182	27.51	29.00	+1.49	0.52490	0.63837	0.1732
23	29	.9420	28.62	28.62	—0.00	0.51909	0.63391	n7.6990
24	30	.9380	27.57	28.37	+0.79	0.51510	0.63085	9.9004
25	31	.9340	27.92	28.08	0.15	0.51078	0.62754	9.1903
26	Aug. 4	.9194	26.18	26.82	0.64	0.49077	0.61234	9.8062
27	5	.9160	26.39	26.48	0.09	0.48519	0.60812	8.9542
28	6	.9128	25.97	26.13	+0.16	0.47961	0.60385	9.2041
29	7	.9096	26.25	25.77	—0.48	0.47238	0.59850	n9.6812
20	8	.9066	25.83	25.41	0.42	0.46740	0.59479	n9.6232
31	10	.9009	24.99	24.68	0.31	0.45482	0.58545	n9.4983
32	12	.8956	24.15	23.96	—0.19	0.44186	0.57589	n9.2900
33	13	.8931	25.20	23.60	+1.60	0.43527	0.57106	n0.2055
34	14	.8907	23.11	23.24	0.13	0.42862	0.56620	9.1139
35	16	.8853	22.41	22.54	+0.13	0.41521	0.55647	9.1139
36	21	.8769	21.43	20.85	—0.58	0.38140	0.53232	n9.7672
37	22	.8753	21.57	20.53	1.04	0.37466	0.52757	n0.0191
38	23	.8738	21.08	20.21	0.87	0.36794	0.52285	n9.9420
39	28	.8672	18.99	18.73	0.26	0.33479	0.49992	n9.4150
40	31	.8641	18.29	17.91	0.38	0.31540	0.48675	n9.5798
41	Sept. 1	.8632	18.43	17.65	0.78	0.30904	0.48248	n9.8921
42	2	.8624	17.87	17.39	0.48	0.30273	0.47826	n9.6857
43	3	.8616	17.66	17.14	0.52	0.29649	0.47410	n9.7202
44	6	.8595	16.68	16.49	0.19	0.27809	0.46196	n9.2900
45	7	.8589	16.61	16.21	0.40	0.27206	0.45803	n9.6075
46	8	.8583	16.33	15.99	—0.34	0.26612	0.45416	n9.5378
	13	.8555	14.80	14.96	+0.16	0.23728	0.43568	9.2041

FORMATION OF EQUATIONS OF CONDITION.

VENUS II.

Equatorial, Washington.

(OBSERVED BOTH LIMBS.)

N°.	Date.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.	p.
1	1852.—May 31	n0.34887	0.29980	n9.95198	n9.12678	n0.1461	+ 0.802	— 0.1339	3.27
2	June 5	n0.29724	0.19654	n0.00369	n9.62201	n0.2788	1.017	0.4188	3.43
3	9	n0.25106	0.10418	n0.03969	n9.78333	n0.1461	1.201	0.6072	3.27
4	11	n0.22549	0.05304	n0.11251	n9.92763		1.679	— 0.8465	
5	Aug. 26	0.32896	0.25998	n0.10896	0.56435		1.652	+ 3.6673	
6	29	0.35848	0.31902	n0.08557	0.61801	0.8692	1.483	+ 4.1496	3.59

FORMATION OF EQUATIONS OF CONDITION.

VENUS II.

Equatorial, Washington.

N°.	Date.	Wash. M.T.	Obs'd r.	2τ.	$\frac{1}{2}D_t\delta_0$.	$\mp\tau D_t\delta_0$.	r_0	n.	log. e.	log. s.	log. n.	p.
			″		″	″	″	″				
1	1852.—May 31	.3422	15.50	0.304	—2.439	— 0.74	15.65	—0.69	0.25664	0.44804	n9.8388	3.59
2	June 5	.3474	18.05	0.077	2.698	— 0.21	16.82	1.55	0.28820	0.46861	n0.1903	3.00
3	9	.3476	20.62	0.410	2.840	+ 1.16	17.87	1.48	0.31453	0.48617	n0.1703	3.27
4	11	.3860	21.40	0.484	—2.886	1.40	18.44	1.45	0.32827	0.49547	n0.1614	3.00
5	Aug. 26	.6570	21.97	0.492	+0.364	0.18	19.36	2.52	0.34935	0.50992	n0.4014	2.67
6	29	.6568	20.63	0.228	+0.180	+ 0.04	18.51	—2.16	0.32964	0.49641	n0.3345	2.67

FORMATION OF EQUATIONS OF CONDITION.

VENUS II.

Meridian, Greenwich.

N°.	Date.	Limb.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.
1	1852.—May 24	S.	n0.41429	0.43064	n9.85546	n9.79050	n0.62325	+ 0.514	— 0.6173
2	July 3	S.	n9.77306	9.14818	n0.22774	n0.33076	n0.38739	2.854	2.1417
3	5	S.	n9.69256	8.98718	n0.24342	n0.33185	9.70757	3.068	2.1471
4	6	S.	n9.64590	8.89386	n0.25080	n0.33159	n0.17026	3.174	2.1458
5	7	S.	n9.59363	8.78932	n0.25788	n0.33072	n9.63347	3.279	2.1415
6	8	S.	n9.53118	8.67042	n0.26162	n0.32929	9.44716	3.383	2.1345
7	12	S.	n9.15017	7.90240	n0.28769	n0.31656	n8.90309	3.762	2.0728
8	13	S.	n8.95952	7.52110	n0.29240	n0.31141	0.12710	3.844	2.0484
9	16	S.	8.95636	7.51478	n0.30366	n0.28294	0.13033	4.049	— 1.9184
10	22	N.	9.58979	8.78164	n0.31199	9.60021	0.48601	4.207	+ 0.3983
11	Aug. 4	S.	0.01544	9.63294	n0.26544	n9.57623	0.72591	3.395	— 0.3769
12	12	S.	0.15685	9.91576	n0.21215	9.79851	0.84386	2.656	+ 0.6288
13	24	S.	0.30821	0.21848	n0.12470	0.37199	0.84572	1.776	2.3550
14	30	N.	0.36800	0.33806	n0.08380	0.72416	0.77452	1.471	5.2986
15	Sept. 1	N.	0.38621	0.37448	n0.07095	0.75068	0.77305	1.386	5.6244
16	2	N.	0.39503	0.39212	n0.06469	0.76263	0.79727	1.347	5.7894
17	13	N.	0.48188	0.56582	n0.00449	0.88662	0.79099	1.021	+ 7.7024

FORMATION OF EQUATIONS OF CONDITION.

VENUS II.

Meridian, Cracow.

(OBSERVED CENTER.)

N°.	Date.	log. b.	log. c.	log. g.	log. s.	log. n.	k^2.	s.
1	1852.—June 2	n0.33385	0.26976	9.91162	0.18181	0.30103	+ 0.666	+ 1.5199
2	3	n0.32367	0.24940	9.92102	0.17681	n0.07918	0.695	1.5025
3	4	n0.31324	0.22854	9.93052	0.17251	n0.50515	0.726	1.4877
4	5	n0.30257	0.20720	9.94007	0.16891	n0.80618	0.759	1.4754
5	7	n0.28039	0.16284	9.95949	0.16391	n0.07918	0.830	1.4586
6	8	n0.268[illegible]6	0.13978	9.96931	0.16265	n9.60206	0.868	1.4543
7	11	n0.23233	0.06672	9.99908	0.16334	9.30103	0.996	1.4566
8	12	n0.21944	0.04094	0.00909	0.16509	0.17609	1.043	1.4625
9	14	n0.19245	0.98696	0.02922	0.17097	n0.74036	1.144	1.4824
10	17	n0.14854	9.89914	0.05951	0.18523	0.71600	1.315	1.5319
11	18	n0.13286	9.86778	0.06959	0.19128	n0.43136	1.378	1.5534
12	23	n0.04469	9.69144	0.11951	0.23040	n9.00000	1.734	1.6998
13	26	n9.98170	9.56546	0.14863	0.25859	n0.23045	1.983	1.8138
14	27	n9.95850	9.51906	0.15811	0.26968	0.80618	2.017	1.8607
15	Aug. 17	0.22574	0.06354	0.16082	0.72108	1.13354	2.097	5.2611
16	18	0.23844	0.06894	0.15344	0.72651	0.79934	2.027	5.3274

§ 10.—WEIGHTS AND MEAN ERRORS.

It is manifest that, whatever efforts may be directed to the investigation of the relative value of the several classes of observations, and to the relative precision of measurements made with different instruments and by different observers, the ultimate combination of these observations must be in a great degree empirical, and, if not directly, yet certainly implicitly dependent upon the judgment and discretion of the investigator. Under no circumstances can this fact be better illustrated than the present.

We are to endeavor to deduce a correction for the adopted parallax from the materials furnished by observations of two different planets, the one superior, the other inferior, and each of them during two oppositions or conjunctions. A measure of relative value for these four diverse cases seems unattainable, and the course of this discussion is directed to the attainment, from each of these four series, of the best independent value which they can be made to yield.

But in each planet-series the case is analogous. We have different classes of observations, some absolute, and some relative ; different instruments, some powerful and some but mediocre ; different stations, some favorable for comparison with the others, and some the reverse; different climates, some offering a cloudless and transparent sky, and some seldom permitting the planet's disc to be distinctly seen ; while the so-called observation itself is in some cases deduced from forty or fifty single comparisons which have occupied a period of several hours, and in others simply the result of a single pointing. To establish a unit of weight common to all, and to determine with correctness the proportionate value of each observation, is purely impossible.

One serious difficulty is encountered on the threshold. Whatever principle we adopt for the determination of the relative weight of an observation from the number of comparisons of which it is composed, it is palpable that the accuracy of a position for a given epoch, deduced from successive measurements of the position of a body in motion, is governed by a different law from that which regulates the precision of the mean of numerous independent measurements, with the same implements, of the position of a body at rest. The discrepancies of the several observations from their mean will be distributed according to a somewhat different law in these two cases; for the circumstances under which the several comparisons are made are constant in the one and slowly varying in the other. The formation of an observation from a number of comparisons at different times is, in fact, the construction of a normal place; whether the intervals between the several measurements be counted in minutes, hours, or even days. There can be no reasonable doubt, since the investigations of Professor Peirce upon the theory of errors, that in repeated measurements of the same quantity by the same instrument a limit is soon attained beyond which an increase of precision by an increase of the number of measurements is either absolutely nothing, or, at the most, inappreciable. To determine this limit is a matter of experiment; and it is very certain that it will not be the same for a variable and for a constant quantity. In fact, the limit for a variable quantity may be regarded as a function of two limits, one of which is the same as for a constant, while the other is not. Therefore our first problem is to determine the relation between the number of comparisons of a planet's limb with a star, and the weight which is to be assigned to the resultant determination of the distance.

The assumption of a probable error inversely proportional to the square root of the number of observations leads, in fact, to palpable absurdity; and if rigorously followed would imply that the mean of a very large number of coarse approximations is preferable to that of a few delicate measurements. It may be pardonable to express, in this connection, the strong belief that a practical adoption of some such principle for guidance seems to be exerting a highly prejudicial influence on astronomical observations in many parts of the world; tending to profligate expenditure of an amount of labor upon the repetition and multiplication of observations, one-fourth of which, if directed to the increase of delicacy rather than the increase of number—to quality, in short, rather than to quantity—would result in a rapid advance, not only of theoretical and sidereal astronomy, but, through these, of all departments of the science. No multiplication of the number of observations can afford a mean entitled to higher reliance than the nature of the instrument permits, or than the methods, manipulations, and sensibility of the observer are competent to attain; and the theory of probabilities soon ceases to contribute to the refinement of an accuracy, of which instrument and observer are incapable of taking cognizance.

Some rule for guidance having been determined upon, we are next to fix the relative weight of positions of the center or measures of diameter, derived from the combination of an unequal number of comparisons for the two limbs.

The probable error of a pointing, too, is entirely different for a planetary limb, for an estimated center, and for a fixed star; and finally, the great inequality in the trustworthiness of the places adopted for the comparison-stars exerts its full influence upon the weight to be assigned to the deduced places of the planet.

These points being disposed of, and values of the several observations of every group being referred to a common unit of weight, we have different groups to be combined with one another, the results of meridian observations with those of equatorial ones, and that uncomfortably

embarrassing problem of relative Weight to be solved, which always arises when observations at different places and of widely different orders of merit are to be blended. The criterion for estimating their relative values is clearly to be supplied by the respective probable errors ; but the attainment of these probable errors is environed with obstacles. The probable errors, as determined by the deviation of the individual comparisons from their average, are clearly not available for this purpose, as the first attempt renders very manifest. Cases are not unfrequent in which the mean error, thus determined, is least for the poorest observations ; and in the present discussion it was found that for one observatory the average deviation of the individual comparisons from their mean was both less than the probable error of this mean, as derived from the discussion of the entire series, and than its actual deviation from the truth.

Nevertheless the investigation of the first-named conventional mean error of observation is a matter of considerable interest, and the results which it furnishes are here appended. They were obtained by reducing the places given by the several comparisons to the corresponding places for the time of their mean, correcting, of course, for differential refraction and differential parallax. For the Santiago equatorial,—in which a correction to the adopted value of the revolution of the micrometer-screw, amounting to 0.″0057 or to about one-half of the last unit employed by Lieutenant Gilliss, was indicated by the solution of the fundamental equations—the values have been corrected also for the change in this constant of reduction. On the other hand the observations of one night, (1849, December 12,) were rejected, being evidently affected by some abnormal source of error. The columns headed ε show the mean variation of each comparison from the mean for each date.

Mean Errors for Comparisons of Mars at Santiago.

Date.	Number.	$\Sigma vv.$	ε.	Date.	Number.	$\Sigma vv.$	ε.
			″				″
1849.—Dec. 11	32 — 2	20.32	± 1.604	1850.—Jan. 12	20 — 2	7.17	± 1.230
15	46 — 2	43.28	1.934	14	24 — 2	14.35	1.574
17	45 — 2	11.83	1.022	22	24 — 2	11.02	1.379
18	25 — 2	13.89	1.515	29	22 — 2	3.32	0.794
21	6 — 2	1.84	1.322	1852.—Jan. 24	46 — 2	42.63	1.918
27	39 — 2	13.50	1.177	30	50 — 2	22.58	1.337
1849.—Dec. 31	36 — 2	14.84	1.288	Feb. 2	30 — 2	3.19	0.658
1850.—Jan. 1	45 — 2	9.33	0.908	3	30 — 2	3.54	0.693
4	50 — 2	13.96	1.051				
6	17 — 2	5.54	1.184	Total	652 —42	282.38	± 1.326
7	27 — 2	11.24	1.307				
9	20 — 2	3 34	0.840				
10	18 — 2	11.67	1.666				

Mean Errors for Comparisons of Venus at Santiago.

Date.	Number.	$\Sigma vv.$	$\varepsilon.$	Date.	Number.	$\Sigma vv.$	$\varepsilon.$
		r.	"			r.	"
1850.—Oct. 19	33 — 1	29.86	± 1.88	1851.—Jan. 24	8 — 1	1.60	± 0.93
22	45 — 1	16.84	1.21	Feb. 5	40 — 2	4.95	0.70
25	21 — 1	6.08	1.08	6	50 — 2	26.44	1.45
29	7 — 1	2.91	1.36	7	24 — 2	2.62	0.67
Nov. 1	22 — 1	3.11	0.75	10	24 — 2	2.83	0.70
2	31 — 1	17.36	1.48	1852.—June 2	13 — 2	3.17	1.05
7	17 — 1	2.23	0.73	23	12 — 2	12.92	2.22
13	24 — 1	4.58	0.87	Aug. 12	9 — 2	6.45	1.87
14	27 — 1	5.42	0.89	16	8 — 2	1.05	0.82
21	22 — 1	3.10	0.75	Sept. 3	10 — 2	2.16	1.01
1851.—Jan. 15	30 — 1	5.80	0.87	8	20 — 2	19.52	2.03
				Total	497 — 32	181.00	± 1.216

Mean Errors for Comparisons of Mars at Washington.

Date.	Number.	$\Sigma vv.$	$\varepsilon.$	Date.	Number.	$\Sigma vv.$	$\varepsilon.$
		r.	"			r.	"
1849.—Nov. 24	10 — 2	8.01	± 1.54	1850.—Jan. 9	14 — 2	49.57	± 3.12
26	80 — 2	148.90	2.17	12	14 — 2	10.75	1.45
Dec. 6	17 — 2	17.49	1.66	14	4 — 2	2.66	1.77
11	11 — 2	28.42	2.73	22	21 — 2	27.87	1.86
12	15 — 2	19.91	1.90	29	6 — 2	19.84	3.42
17	37 — 2	28.53	1.39	1852.—Jan. 24	12 — 2	11.91	1.68
27	42 — 2	94.64	2.36	30	8 — 2	10.48	2.03
31	24 — 2	66.31	2.61	Feb. 2	16 — 2	5.65	0.97
1850.—Jan. 5	24 — 2	50.68	2.33	3	18 — 2	7.49	1.05
				Total	373 — 36	609.11	± 2.067

Mean Errors for Comparisons of Venus at Washington.

Date.	Number.	$\Sigma vv.$	$\varepsilon.$	Date.	Number.	$\Sigma vv.$	$\varepsilon.$
		r.	"			r.	"
1850.—Oct. 19	7 — 2	4.12	± 1.40	1851.—Jan. 15	32 — 2	29.13	± 1.51
22	9 — 2	4.00	1.16	24	8 — 2	3.37	1.15
Nov. 1	8 — 2	4.29	1.30	1852.—May 31	15 — 2	15.75	1.69
2	15 — 2	15.91	1.70	June 5	10 — 2	6.22	1.36
13	8 — 2	3.68	1.21	9	12 — 2	3.94	0.96
14	8 — 2	5.74	1.50	11	10 — 2	6.12	1.34
21	21 — 2	14.54	1.34	Aug. 26	8 — 2	13.66	2.32
1851.—Jan. 13	24 — 2	29.38	1.48	29	8 — 2	8.40	1.82
				Total	203 — 32	159.25	± 1.487

Mean Errors for Comparison of Mars at the Cape of Good Hope.

Date.	Number.	$\Sigma vv.$	$\varepsilon.$	Date.	Number.	$\Sigma vv.$	$\varepsilon.$
		r.	″			r.	″
1849.—Nov. 21	4 — 2	6.90	± 1.86	1849.—Dec. 17	10 — 2	8.82	± 1.05
21	4 — 2	0.62	0.56	18	10 — 2	8.80	1.05
24	4 — 2	0.86	0.66	18	10 — 2	10.98	1.17
26	6 — 2	23.52	2.42	21	4 — 2	0.77	0.62
30	4 — 2	0.53	0.51	21	4 — 2	1.49	0.86
Dec. 6	20 — 2	15.52	0.93	29	5 — 2	0.33	0.33
8	10 — 2	4.98	0.79	1850.—Jan. 7	4 — 2	1.54	0.88
8	10 — 2	1.07	0.37	9	4 — 1	8.11	1.64
14	10 — 2	2.38	0.55	10	4 — 1	0.78	0.51
15	10 — 2	9.45	1.09	12	4 — 2	0.15	0 27
17	10 — 2	6.67	0.91	14	6 — 2	0.64	0.40
				Total	157 —42	114.91	± 0.9996

Mean Errors for Comparisons of Mars at Greenwich.

Date.	Number.	$\Sigma vv.$	$\varepsilon.$	Date.	Number.	$\Sigma vv.$	$\varepsilon.$
		r.	″			r.	″
1849.—Nov. 26	4 — 2	42.30	± 4.60	1849.—Dec. 27	6 — 1	16.32	± 1.85
30	4 — 2	32.86	4.05	1850.—Jan. 4	6 — 2	0.41	0.32
Dec. 8	5 — 1	6.74	1.30	5	8 — 2	8.73	1.21
15	4 — 1	19.49	2.55	7	3 — 1	3.16	1.26
				Total	40 —12	130.01	± 2.155

Mean Errors for Comparisons of Mars at Cambridge.

Date.	Number.	$\Sigma vv.$	$\varepsilon.$	Date.	Number.	$\Sigma vv.$	$\varepsilon.$
		r.	″			r.	″
1849.—Nov. 21	15 — 2	4.73	± 0 59	1849.—Dec. 28	10 — 2	1.13	± 0.37
21	11 — 2	1.95	0.46	29	4 — 1	21.61	2.63
26	5 — 1	0.44	0.33	31	12 — 1	23.71	1.44
30	6 — 1	1.15	0.47	1850.—Jan. 1	11 — 1	2.50	0.49
Dec. 11	8 — 2	1.68	0.52	4	4 — 1	2.54	0.90
17	4 — 1	0.96	0.55	5	10 — 2	3.19	0.62
21	5 — 1	0.56	0.37	6	7 — 1	1.05	0.41
27	5 — 1	0.38	0.30	10	7 — 1	0.85	0.37
				Total	124 —21	68.43	± 0.790

RECAPITULATION.

Mean Errors for the different Places of Observation, as deduced from the variations of the several Comparisons from their mean.

Place.	N°. comp.	N°. of obs.	Planet.	Mean error.
				″
Santiago . . .	652	42	Mars	± 1.326
Santiago . . .	497	32	Venus . . .	1.216
Santiago . . .	1,149	74	Both . . .	1.278
Washington .	373	36	Mars	2.067
Washington .	203	32	Venus . . .	1.487
Washington .	576	68	Both . . .	1.872
Cape G. H. . .	157	42	Mars	1.000
Greenwich . .	40	12	Mars	2.155
Cambridge . .	124	21	Mars	0.790

How untrustworthy any function of this mean error would be as a guide in assigning the proportionate weights to the different series before combining them in one, may be inferred from a single glance at the values of **x**, approximately deduced from the different sets of observations, on the assumption that the unknown quantities **z** and **v** are negligible. We may do this by simply solving the equations:

$$\mathbf{y} = \frac{[aa]\,[bn] - [ab]\,[an]}{[aa]\,[bb] - \quad [ab]^2}, \qquad \mathbf{x} = \frac{[an] - [ab]\,\mathbf{y}}{[aa]}$$

and shall find—

	Mars I.	Mars II.	Venus I.	Venus II.
	"	"	"	"
Santiago equatorial	+ 1.294	+ 0.606	— 0.271	+ 1.634
" meridian		+ 0.450	+ 2.938	+ 2.529
" " (suppl.)		— 0.062		
Washington equatorial	+ 1.732	+ 1.387	— 2.932	+ 2.603
Cape "	+ 1.939			
" meridian	+ 1.278	+ 0.094		
Greenwich equatorial	— 0.522			
" meridian	— 0.076	+ 0.584	+ 3.172	+ 1.083
Cambridge equatorial	+ 1.298			
Athens meridian	+ 6.627			
Kremsmünster meridian		— 0.142		
Cracow "				+ 4.573
Altona "			— 0.970	

The only method available for attaining impartial discrimination seems to be the determination of the mean error of an observation, by means of a preliminary solution of normal equations, derived from empirical combination of the several groups for each planet-series. Assuming the values thus obtained for our unknown quantities as sufficiently correct, we may substitute them in the final equations of each group, and thus proceed to a determination of the weight for each from the sum of the squares of the residuals outstanding after the substitution.

At the same time we become entitled to compare the different values of the unknown quantities furnished by the several planet-series, and to remove the terms containing **t**, **u**, and **v**, which will have been determined with sufficient approximation, and which have only been introduced into our formulas for the sake of avoiding any possible error with which they might, if disregarded, affect our ultimate values for the remaining unknown quantities.

For this preliminary solution, we may be permitted to attribute equal precision to the work of the several observatories, omitting, however, all observations made at places for which the details of the observations are inaccessible, and examination of the reductions consequently impossible. The question of the relative value of the several groups can then be considered with greater propriety.

The relation of the weight of the observation to the number of comparisons of which it is composed is the first topic for consideration.

In forming the catalogue of star-places the ordinary principle of combination has been retained, and for a two-fold reason. In the first place, the number of observations of the same

star from any one authority was rarely sufficient to render the resulting places essentially different, whatever the principle adopted for the assignment of weights; and secondly, so large an amount of labor had already been expended on the determination of these places before my attention was drawn to this question, that a repetition of the work would have entailed an expenditure of time and care altogether disproportionate to the possible increase of accuracy in the resultant places; an increase which would certainly have been of a different order of magnitude from the inevitable uncertainty of the ultimate determination. The numbers annexed to the star-places of our General Catalogue, and there denominated *weights*, should in truth be divided by a factor which for the majority of cases is not far from constant; but the assumption of a limit of accuracy beyond which the multiplication of observations is comparatively useless renders even such division much less important, and these quantities may therefore be practically regarded as representing the number of standard observations from which the adopted positions are derived. This number is generally large enough to render the assumption very reasonable, and the principle has been followed throughout the present computation.

For the determination of the value of a measured position from the number of its constituent observations, or of the weight of an observation as a function of the number of comparisons upon which it depends, let us, as the simplest, and a fully sufficient means of attaining the end designed, consider each of the set of individual comparisons as affected with a constant error c, and introduce this constant error as a multiple of the theoretical mean error ε. For simplicity's sake we will disregard the technical "probable error," to which, of course, the linear functions of the mean error are convertible by multiplication with the constant factor, and will employ only the quantity ε, which we may call the probable discordance from the mean.

We shall then have, by putting $c = a\varepsilon$, the probable mean errors, thus:

For the result from 1 observation, $\varepsilon . \sqrt{a^2 + 1}$

" " n observations, $\varepsilon . \sqrt{a^2 + \frac{1}{n}}$

the weights of the two determinations being respectively $\frac{1}{a^2+1}$, and $\frac{n}{na^2+1}$. Consequently the result from n observations has, when compared with that from 1 observation, the weight—

$$P^{(n)} = n . \frac{a^2 + 1}{na^2 + 1}$$

which assumes a more convenient form if instead of a, the ratio of the errors, we introduce b, the ratio of the weights, so that

$$b = \frac{1}{a^2} = \frac{\varepsilon^2}{c^2}; \quad P^{(n)} = n . \frac{b+1}{n+b}.$$

The determination of the value b is of necessity empirical, and its magnitude dependent upon the quality of the observations, increasing in the ratio of their delicacy; so that twenty-five measurements from a source for which $b = 5$ are worth five times as much as one measurement, thirty-six comparisons where $b = 6$ are worth six times as much as one, &c. No number of measurements, however great, would, in the first instance, be six times, or in the second one, seven times as valuable as a single one.

Under some circumstances it may be found desirable to give another form to the expression for the weight, especially when different sets of observations are to be compared with one

another. This may readily and conveniently be done by introducing an empirical constant of the form $A = \frac{b}{1+b}$ in the place of b. Then,

$$P^{(n)} = \frac{n}{n - A(n-1)} = \frac{n}{A + n(1-A)}$$

The annexed table is based upon the hypothesis of $A = \frac{5}{6}$; or, what is the same thing, $b = 5$, a value which experiment appears to indicate as more probable than any other integer for the average of the observations under discussion.

Weights as Functions of the Number of Observations.

N°.	Weight.	N°.	Weight.	N°.	Weight.	N°.	Weight.	N°.	Weight.	N°.	Weight.
1	1.00	11	4.13	21	4.85	31	5.17	41	5.35	60	5.538
2	1.71	12	4.24	22	4.89	32	5.19	42	5.36	70	5.600
3	2.25	13	4.33	23	4.93	33	5.21	43	5.38	80	5.647
4	2.67	14	4.42	24	4.97	34	5.23	44	5.39	90	5.684
5	3.00	15	4.50	25	5.00	35	5.25	45	5.40	100	5.714
6	3.27	16	4.57	26	5.03	36	5.27	46	5.41	200	5.854
7	3.50	17	4.64	27	5.06	37	5.29	47	5.42	300	5.901
8	3.69	18	4.70	28	5.09	38	5.30	48	5.43	400	5.926
9	3.86	19	4.75	29	5.12	39	5.32	49	5.44	500	5.941
10	4.00	20	4.80	30	5.14	40	5.33	50	5.45	1000	5.970

Where two results are to be combined, the one derived from n, the other from n' observations, and having respectively the weights $P^{(n)}$ and $P^{(n')}$, we shall have

$$P^{(n,n')} = \frac{P^{(n)}\,P^{(n')}}{P^{(n)} + P^{(n')}}, \text{ or } \frac{1}{P^{(n,n')}} = \frac{1}{P^{(n)}} + \frac{1}{P^{(n')}}$$

And since—

$$P^{(n)} = n.\,\frac{1+b}{n+b}, \qquad P^{(n')} = n'.\,\frac{1+b}{n'+b}$$

$$\frac{1}{P^{(n,n')}} = \frac{1}{1+b}.\,\frac{2\,n\,n' + (n+n')\,b}{nn'}$$

Or—

$$P^{(n,n')} = \frac{1+b}{2 + \left(\frac{1}{n} + \frac{1}{n'}\right)b}$$

From this formula, and the assumption as before $b = 5$, the table is constructed which gives the weights as functions of two numbers of observations, the decimal point being avoided by assuming 100 as the unit of weight. The quantities under discussion being the means of the two sets of observations, are entitled, after halving, to a double weight, so that the tabulated function is—

$$2\,P^{(n,n')} = \frac{12}{2 + 5\left(\frac{1}{n} + \frac{1}{n'}\right)}\,100$$

The last table contains, of course, the values given by the present one for the special case when $n = n'$; that is to say, when the number of observations is equal in the two sets and their mean is taken.

WEIGHTS AS DEPENDENT UPON

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
1	100	126	138	145	150	153	155	157	159	160	161	162	162	163	164	165	165	165	165	166	166	166	166
2	126	171	195	209	218	225	230	234	237	240	242	244	245	247	248	249	250	251	252	253	253	254	254
3	138	195	225	244	257	267	274	280	284	288	291	294	296	298	300	302	303	304	305	306	307	308	309
4	145	209	244	267	282	294	303	310	315	320	324	327	330	333	335	337	339	341	342	343	344	345	346
5	150	218	257	282	300	313	323	331	338	343	347	351	355	358	360	362	364	366	368	369	370	372	373
6	153	225	267	294	313	327	338	347	354	360	365	369	373	376	379	381	383	385	387	389	391	393	394
7	155	230	274	303	323	338	350	359	366	373	379	383	387	391	394	396	399	401	403	405	406	408	409
8	157	234	280	310	331	347	359	369	377	384	390	395	399	403	406	409	411	413	415	417	419	421	423
9	159	237	284	315	338	354	366	377	386	393	399	404	408	412	415	418	421	423	426	428	430	431	433
10	160	240	288	320	343	360	373	384	393	400	406	411	416	420	424	427	429	432	434	436	438	440	442
11	161	242	291	324	347	365	379	390	399	406	413	418	423	427	430	434	437	439	442	444	446	447	449
12	162	244	294	327	351	369	383	395	404	411	418	424	428	433	436	440	443	445	448	450	452	454	456
13	162	245	296	330	355	373	387	399	408	416	423	428	433	438	442	445	448	451	453	455	458	459	461
14	163	247	298	333	358	376	391	403	412	420	427	433	438	442	446	449	452	455	458	460	462	464	466
15	164	248	300	335	360	379	394	406	415	424	430	436	442	446	450	454	457	460	462	464	467	469	470
16	165	249	302	337	362	381	396	409	418	427	431	440	445	449	454	457	460	463	466	468	470	472	474
17	165	250	303	339	364	383	399	411	421	429	437	443	448	452	457	460	464	466	469	472	474	476	478
18	165	251	304	341	366	385	401	413	423	432	439	445	451	455	460	463	466	470	472	475	477	479	481
19	165	252	305	342	368	387	403	415	426	434	442	448	453	458	462	466	469	472	475	478	480	482	484
20	166	253	306	343	369	389	405	417	428	436	444	450	455	460	464	468	472	475	478	480	482	484	486
21	166	253	307	344	370	391	406	419	430	438	446	452	458	462	467	470	474	477	480	482	485	486	488
22	166	254	308	345	372	393	408	421	431	440	447	454	459	464	469	472	476	479	482	484	486	489	491
23	166	254	309	346	373	394	409	423	433	442	449	456	461	466	470	474	478	481	484	486	488	491	493
24	166	255	310	347	374	395	411	424	434	443	451	457	463	467	472	476	480	483	486	488	490	493	495
25	167	255	310	348	375	396	412	425	435	444	452	459	464	469	474	477	481	484	488	490	492	494	496
26	167	256	311	349	376	397	413	426	437	446	453	460	466	471	476	479	482	486	489	491	494	496	498
27	167	256	312	349	377	398	414	427	438	447	454	461	467	472	477	480	484	487	490	493	495	497	499
28	167	257	312	350	378	398	415	428	439	448	456	462	468	473	478	482	485	489	492	494	497	499	501
29	167	257	313	351	378	399	416	429	440	449	457	463	469	474	479	483	486	490	493	495	498	500	502
30	167	257	313	351	379	400	417	430	441	450	458	465	470	476	480	484	488	491	494	497	499	501	503
31	168	257	313	352	380	401	417	431	442	451	459	465	471	476	481	485	489	492	495	498	500	502	504
32	168	258	314	352	380	401	418	431	443	452	460	466	472	477	482	486	490	493	496	499	501	503	505
33	168	258	314	353	381	402	419	432	443	453	460	467	473	478	483	487	491	494	497	500	502	504	506
34	168	258	315	353	381	403	419	433	444	453	461	468	474	479	484	488	491	495	498	501	503	505	507
35	168	258	315	354	382	403	420	434	445	454	462	469	475	480	485	489	492	496	499	502	504	506	508
36	168	259	315	354	382	404	421	434	445	455	463	470	476	481	485	490	493	497	500	502	505	507	509
37	168	259	316	355	383	404	421	435	446	455	463	470	476	481	486	490	494	497	500	503	506	508	510
38	168	259	316	355	383	405	422	435	447	456	464	471	476	482	487	491	495	498	501	504	506	509	511
39	168	259	316	355	384	405	422	436	447	457	465	471	478	483	488	492	495	499	502	505	507	509	511
40	168	259	316	356	384	406	423	436	448	457	465	472	478	483	488	492	496	499	503	505	508	510	512
1	168	260	317	356	384	406	423	437	448	458	466	473	479	484	489	493	497	500	503	506	508	511	513
42	169	260	317	356	385	407	424	437	449	458	466	473	479	485	489	493	497	501	504	507	509	511	513
43	169	260	317	356	385	407	424	438	449	459	467	474	480	485	490	494	498	501	504	507	509	512	514
44	169	260	317	357	386	408	424	438	450	459	467	474	480	486	491	495	498	502	505	508	510	513	515
45	169	260	318	357	386	408	425	439	450	460	468	475	481	486	491	495	499	502	505	508	511	513	515
46	169	260	318	357	386	408	425	439	450	460	468	475	481	487	491	495	499	503	506	509	511	513	515

TWO SETS OF MEASUREMENTS.

24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	42	44	46	48	50	
166	167	167	167	167	167	167	168	168	168	168	168	168	168	168	168	168	169	169	169	169	169	1
255	255	256	256	257	257	257	257	258	258	258	258	259	259	259	259	259	260	260	260	261	261	2
310	310	311	312	312	313	313	313	314	314	315	315	315	316	316	316	316	317	317	318	318	319	3
347	348	349	349	350	351	351	352	352	353	353	354	354	355	355	355	356	356	357	357	358	358	4
374	375	376	377	378	378	379	380	380	381	381	382	382	383	383	384	384	385	386	386	387	387	5
395	396	397	398	398	399	400	401	401	402	403	403	404	404	405	405	406	407	408	408	409	409	6
411	412	413	414	415	416	417	417	418	419	419	420	421	421	422	422	423	424	424	425	426	426	7
424	425	426	427	428	429	430	431	431	432	433	434	434	435	435	436	436	437	438	439	440	440	8
434	435	437	438	439	440	441	442	443	443	444	445	445	446	447	448	448	449	450	450	451	452	9
443	444	446	447	448	449	450	451	452	453	453	454	455	455	456	457	457	458	459	460	461	462	10
451	452	453	454	456	457	458	459	460	460	461	462	463	463	464	465	465	466	467	468	469	470	11
457	459	460	461	462	463	465	465	466	467	468	469	470	470	471	471	472	473	474	475	476	477	12
463	464	466	467	468	469	470	471	472	473	474	475	476	476	476	478	478	479	480	481	482	483	13
467	469	471	472	473	474	476	476	477	478	479	480	481	481	482	483	483	485	486	487	488	488	14
472	474	476	477	478	479	480	481	482	483	484	485	485	486	487	488	488	489	491	491	492	493	15
476	477	479	480	482	483	484	485	486	487	488	489	490	490	491	492	492	493	495	495	496	497	16
480	481	482	484	485	486	488	489	490	491	491	492	493	494	495	495	496	497	498	499	500	501	17
483	484	486	487	489	490	491	492	493	494	495	496	497	497	498	499	499	501	502	503	504	505	18
486	488	489	490	492	493	494	495	496	497	498	499	500	500	501	502	503	504	505	506	507	508	19
488	490	491	493	494	495	497	498	499	500	501	502	502	503	504	505	505	507	508	509	510	511	20
490	492	494	495	497	498	499	500	501	502	503	504	505	506	506	507	508	509	510	511	512	513	21
493	494	496	497	499	500	501	502	503	504	505	506	507	508	509	509	510	511	513	513	514	516	22
495	496	498	499	501	502	503	504	505	506	507	508	509	510	511	511	512	513	515	515	516	518	23
497	498	500	501	503	504	505	506	507	508	509	510	511	512	513	513	514	515	517	517	518	520	24
498	500	501	503	504	506	507	508	509	510	511	512	513	514	515	515	516	517	518	519	520	522	25
500	501	503	505	506	507	509	510	511	512	513	514	515	516	516	517	518	519	520	521	522	523	26
501	503	505	506	507	509	510	511	512	513	514	515	516	517	518	519	519	521	522	523	524	525	27
503	504	506	507	509	510	512	513	514	515	516	517	518	519	520	520	521	522	523	524	525	527	28
504	506	507	509	510	512	513	514	515	516	517	518	519	520	521	522	522	524	525	526	527	528	29
505	507	509	510	512	513	514	515	517	518	519	520	521	522	523	523	524	525	526	527	528	529	30
506	508	510	511	513	514	515	517	518	519	520	521	522	523	524	524	525	526	527	529	530	531	31
507	509	511	512	514	515	517	518	519	520	521	522	523	524	525	525	526	528	529	530	531	532	32
508	510	512	513	515	516	518	519	520	521	522	523	524	525	526	526	527	529	530	531	532	533	33
509	511	513	514	516	517	519	520	521	522	523	524	525	526	527	527	528	530	531	532	533	534	34
510	512	514	515	517	518	520	521	522	523	524	525	526	527	528	528	529	531	532	533	534	535	35
511	513	515	516	518	519	521	522	523	524	525	526	527	528	529	529	530	532	533	534	535	536	36
512	514	516	517	519	520	522	523	524	525	526	527	528	529	529	530	531	532	533	535	536	538	37
513	515	516	518	520	521	523	524	525	526	527	528	529	529	530	531	532	533	534	536	537	538	38
513	515	517	519	520	522	523	524	525	526	527	528	529	530	531	532	532	534	535	537	538	538	39
514	516	518	519	521	522	524	525	526	527	528	529	530	531	532	532	533	535	536	538	539	539	40
515	516	518	520	521	523	524	526	527	528	529	530	531	532	532	533	534	536	537	538	539	540	41
515	517	519	521	522	524	525	526	528	529	530	531	532	532	533	534	535	536	537	539	540	541	42
516	518	520	521	523	524	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	542	43
517	518	520	522	523	525	526	527	529	530	531	532	533	533	534	535	536	537	539	540	541	542	44
517	519	521	523	524	526	527	528	529	530	531	532	533	534	535	536	537	538	539	540	542	543	45
517	519	521	523	524	526	527	529	530	531	532	533	534	535	536	537	538	539	540	541	542	543	46

WEIGHTS AS DEPENDENT UPON

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23
47	169	261	318	358	386	408	425	439	451	460	469	476	482	487	492	496	500	503	506	509	512	514	516
48	169	261	318	358	387	409	426	440	451	461	469	476	482	488	492	496	500	504	507	510	512	514	516
49	169	261	319	358	387	409	426	440	452	461	470	477	483	488	493	497	501	501	507	510	513	515	517
50	169	261	319	358	387	409	426	440	452	462	470	477	483	488	493	497	501	505	508	511	513	516	518
52	169	261	319	358	388	410	427	441	453	462	471	477	484	489	494	498	502	505	508	511	514	516	518
54	169	261	319	359	388	410	428	442	453	463	471	478	484	490	494	499	503	506	509	512	515	517	519
56	169	261	319	359	388	411	428	442	454	464	472	479	485	490	495	499	503	507	510	513	515	518	520
58	169	262	320	359	389	411	429	443	454	464	472	480	486	491	496	500	504	507	510	513	516	519	521
60	169	262	320	360	389	411	429	443	455	464	473	480	486	492	497	501	505	508	511	514	517	519	522
62	169	262	320	360	390	412	429	444	455	465	473	480	487	492	497	501	505	508	512	515	517	519	522
64	170	262	320	361	390	412	430	444	456	465	474	481	487	493	498	502	506	509	512	516	518	520	523
66	170	262	321	361	390	413	430	444	456	466	474	481	488	493	498	503	506	510	513	516	519	521	523
68	170	262	321	361	390	413	430	445	456	466	475	482	488	494	499	503	507	510	514	517	520	522	524
70	170	262	321	361	391	413	431	445	457	467	475	482	489	494	499	503	507	511	514	517	520	522	524
72	170	263	321	362	391	413	431	445	457	467	475	483	489	495	499	504	508	511	514	517	520	523	525
74	170	263	321	362	391	414	432	446	457	467	476	483	489	495	500	504	508	512	515	518	520	523	525
76	170	263	322	362	391	414	432	446	458	468	476	483	490	495	500	505	508	512	515	518	521	524	526
78	170	263	322	362	392	414	432	447	458	468	476	484	490	496	501	505	509	512	516	519	521	524	526
80	170	263	322	362	392	414	432	447	458	468	477	484	490	496	501	505	509	513	516	519	522	524	526
90	170	264	322	363	393	415	433	448	460	469	478	485	491	497	502	506	510	514	517	520	523	525	527
100	170	265	323	364	393	416	434	449	461	471	479	486	493	499	504	508	512	516	519	522	524	527	529

two sets of Measurements—Continued.

24	25	26	27	28	29	30	31	32	33	34	35	36	37	38	39	40	42		46	48	50	
518	520	522	523	525	526	528	529	530	531	532	533	534	535	536	537	538	539	540	542	543	544	47
518	520	522	524	525	527	528	530	531	532	533	534	535	536	537	538	539	540	541	542	543	544	48
519	521	523	524	526	527	529	530	532	532	533	534	535	536	537	538	539	540	542	543	544	545	49
520	522	523	525	527	528	529	531	532	533	534	535	536	538	538	538	539	541	542	543	544	545	50
520	522	524	526	527	529	530	532	533	534	535	536	537	538	539	539	540	542	543	544	545	546	52
521	523	525	527	528	530	531	533	534	535	536	537	538	539	539	540	541	543	544	545	546	547	54
522	524	526	527	529	530	532	533	534	536	537	538	539	539	540	541	542	543	544	546	547	548	56
523	525	527	528	530	531	533	534	535	536	537	538	539	540	541	542	543	544	545	547	548	549	58
524	526	527	529	531	532	533	535	526	537	538	539	540	541	542	543	543	545	546	547	549	550	60
525	526	527	529	531	532	534	535	536	537	538	540	541	541	542	543	544	546	547	548	549	550	62
525	527	528	530	531	533	535	536	537	538	539	540	541	542	543	544	544	546	547	549	550	551	64
525	527	528	530	532	533	535	537	538	539	540	541	542	543	543	544	545	547	548	549	550	552	66
526	528	529	531	533	534	536	538	539	541	541	542	543	543	544	545	545	547	549	550	551	552	68
526	528	530	532	533	535	536	538	539	540	541	542	543	544	545	546	546	548	549	550	552	553	70
527	529	531	532	534	535	537	538	539	540	541	542	543	544	545	546	547	548	550	551	552	553	72
527	529	531	533	534	536	537	538	540	541	542	543	544	545	546	546	547	549	550	551	553	554	74
528	530	531	533	535	536	537	539	540	541	542	543	544	545	546	547	548	549	551	552	553	554	76
528	530	532	534	535	537	538	539	540	542	543	544	545	546	546	547	548	550	551	552	553	554	78
528	530	532	534	535	537	538	540	541	542	543	544	545	546	547	548	549	550	551	553	554	555	80
529	531	533	535	537	538	540	541	542	543	544	545	546	547	548	549	550	552	553	554	556	557	90
531	533	535	537	538	540	541	543	544	545	546	547	548	549	550	551	552	553	555	556	557	558	100

This table has been employed alike to furnish weights for the determination of the places of a planet's center deduced from observations of the two limbs, and for the weight of positions depending on comparisons with a star. In the former case n and n' are the respective numbers of observations of each limb; in the latter the one denotes the number of observations upon which the adopted declination of the star rests, and the other the number of comparisons.

In order to combine the additional equations resulting from diameter-measurements with the other equations of condition, we may consider the weight of a pointing to a planet's limb as one-half that of a setting upon a star. Inasmuch as the equations are all formed with reference to the semidiameters, or one half the quantity actually measured, it is evident that we have merely to assign the unit of weight to each additional equation derived from a direct measurement.

From the same assumption as to the relative precision of the two kinds of setting we perceive that the equations derived from indirect measurement are each entitled to one half the weight which belongs to the primary equations of condition to which they correspond.

The same principles regulate the weights of the supplementary equations derived from micrometric observations upon the meridian. In these observations, however, it will be borne in mind that, from the nature of the case, only one comparison was possible.

In combining absolute meridian determinations with the comparative measurements furnished by the micrometers of the equatorials, new difficulties arose. The most reasonable, as well as the simplest, course seemed to be to assign the weight unity to each meridian observation, considering the resultant position as dependent upon the combination of one pointing to the object with one observation of the nadir. The errors of graduation are necessarily ignored. In the meridian observations at Athens the equator-point was deduced from the *Mars*-culminating stars, and the consideration of the latitude thus eliminated. Yet an inspection of the various values of the equator-point will show that the resultant determinations can scarcely be entitled to claim a weight greater than unity. All consideration of the latitude is here eliminated. But for the other places at which meridian observations were made, any error in the adopted latitude will affect our result by its full amount. To obviate this difficulty as far as possible the same constant correction is applied to the meridian observations of the planet's declination which was previously found applicable to the measured declination of stars. These corrections are:

Santiago..............*Mars* II — 0.″12
Cape of Good Hope, *Mars* I — 0.″59
Cape of Good Hope, *Mars* II — 1.″32
Greenwich.............*Mars* I + 0.″10
Greenwich.............*Mars* II — 0.″06

For both series of *Venus*-observations the corrections have been applied which were found for the *Mars*-series.

There remain the observations at Kremsmünster and Cracow, and the two of *Venus* I at Altona, for which no details whatsoever are given. These are necessarily to be omitted from the fundamental equations for the preliminary solutions.

§ 11.—FUNDAMENTAL EQUATIONS.

The various products of the coefficients having been duly formed and summed, we obtain the systems of final equations, which constitute the only source for all the deductions possible from the present investigation. They follow in their regular order.

A. FINAL EQUATIONS FOR MARS I.

1. *Santiago Equatorial.*

$$245.980\,x + 50.301\,y + 66.012\,z - 65.862\,v + 322.302\,w + 195.44 = 0$$
$$50.301\,x + 165.077\,y + 39.811\,z + 16.342\,v + 39.760\,w - 470.31 = 0$$
$$66.012\,x + 39.811\,y + 32.841\,z - 17.828\,v + 80.599\,w - 48.93 = 0$$
$$-65.862\,x + 16.342\,y - 17.828\,z + 448.187\,v - 90.420\,w - 350.49 = 0$$
$$322.302\,x + 39.760\,y + 80.599\,z - 90.420\,v + 427.058\,w + 344.76 = 0$$
$$[nn] = 2126.19$$
$$211.460\,t + 324.364\,u - 469.397 = 0$$
$$324.364\,t + 503.332\,u - 717.614 = 0$$
$$[nn] = 1095.428$$

2. *Washington Equatorial.*

$$93.950\,x - 92.428\,y + 100.243\,z - 36.292\,w + 329.73 = 0$$
$$-92.428\,x + 250.553\,y - 211.748\,z + 39.342\,w - 616.86 = 0$$
$$100.243\,x - 211.748\,y + 222.347\,z - 40.298\,w + 498.27 = 0$$
$$-36.292\,x + 39.342\,y - 40.298\,z + 14.215\,w - 135.85 = 0$$
$$[nn] = 2074.59$$
$$76.990\,t + 120.312\,u - 248.693 = 0$$
$$120.312\,t + 189.217\,u - 388.831 = 0$$
$$[nn] = 976.024$$

3. *Cape of Good Hope Equatorial.*

$$156.410\,x - 114.932\,y + 75.039\,z + 222.207\,v + 221.511\,w + 510.68 = 0$$
$$-114.932\,x + 187.576\,y - 103.827\,z - 121.703\,v - 169.220\,w - 561.35 = 0$$
$$75.039\,x - 103.827\,y + 69.424\,z + 99.935\,v + 106.929\,w + 316.13 = 0$$
$$222.207\,x - 121.703\,y + 99.935\,z + 1509.463\,v + 309.533\,w + 538.11 = 0$$
$$221.511\,x - 169.220\,y + 106.929\,z + 309.533\,v + 314.688\,w + 738.93 = 0$$
$$[nn] = 2136.65$$
$$103.150\,t + 170.780\,u + 20.102 = 0$$
$$170.780\,t + 283.620\,u + 31.715 = 0$$
$$[nn] = 47.116$$

4. *Cape of Good Hope Meridian.*

$$46.000\,x - 29.619\,y + 21.694\,z + 64.792\,w + 130.97 = 0$$
$$-29.619\,x + 54.230\,y - 30.617\,z - 43.931\,w - 170.00 = 0$$
$$21.694\,x - 30.617\,y + 21.778\,z + 30.783\,w + 93.80 = 0$$
$$64.792\,x - 43.931\,y + 30.783\,z + 91.590\,w + 191.60 = 0$$
$$[nn] = 734.81$$

5. *Greenwich Equatorial.*

$$20.200\,x - 5.291\,y + 4.297\,z - 16.548\,w - 1.00 = 0$$
$$-5.291\,x + 10.749\,y - 5.903\,z + 5.911\,w - 16.64 = 0$$
$$4.297\,x - 5.903\,y + 3.290\,z - 4.382\,w + 5.02 = 0$$
$$-16.548\,x + 5.911\,y - 4.382\,z - 14.102\,w - 1.72 = 0$$
$$[nn] = 51.77$$

6. *Greenwich Meridian.*

$$
\begin{array}{rrrrrrl}
24.000\,\mathbf{x} & +\ 4.677\,\mathbf{y} & +\ 26.950\,\mathbf{z} & +\ 17.000\,\mathbf{t} & -\ 14.584\,\mathbf{w} & -\ 11.50 & =0 \\
4.677\,\mathbf{x} & +\ 67.389\,\mathbf{y} & +\ 8.152\,\mathbf{z} & +\ 2.944\,\mathbf{t} & +\ 0.894\,\mathbf{w} & -\ 139.70 & =0 \\
26.950\,\mathbf{x} & +\ 8.152\,\mathbf{y} & +\ 58.878\,\mathbf{z} & +\ 9.015\,\mathbf{t} & -\ 14.748\,\mathbf{w} & -\ 64.67 & =0 \\
17.000\,\mathbf{x} & +\ 2.944\,\mathbf{y} & +\ 9.015\,\mathbf{z} & +\ 19.000\,\mathbf{t} & -\ 10.854\,\mathbf{w} & +\ 6.80 & =0 \\
-14.584\,\mathbf{x} & +\ 0.894\,\mathbf{y} & -\ 14.748\,\mathbf{z} & -\ 10.854\,\mathbf{t} & +\ 9.150\,\mathbf{w} & -\ 3.41 & =0
\end{array}
$$

$$[nn] = 399.63$$

7. *Cambridge Equatorial.*

$$
\begin{array}{rrrrrrrl}
60.080\,\mathbf{x} & -\ 59.593\,\mathbf{y} & +\ 47.431\,\mathbf{z} & -\ 0.900\,\mathbf{t} & -\ 1.006\,\mathbf{u} & -\ 37.988\,\mathbf{w} & +\ 176.26 & =0 \\
-59.593\,\mathbf{x} & +\ 118.579\,\mathbf{y} & -\ 96.401\,\mathbf{z} & +\ 8.803\,\mathbf{t} & +\ 13.557\,\mathbf{u} & +\ 41.064\,\mathbf{w} & -\ 277.99 & =0 \\
47.431\,\mathbf{x} & -\ 96.401\,\mathbf{y} & +\ 80.976\,\mathbf{z} & -\ 8.774\,\mathbf{t} & -\ 13.796\,\mathbf{u} & -\ 31.783\,\mathbf{w} & +\ 220.35 & =0 \\
-0.900\,\mathbf{x} & +\ 8.803\,\mathbf{y} & -\ 8.774\,\mathbf{z} & +\ 31.020\,\mathbf{t} & +\ 50.396\,\mathbf{u} & -\ 0.002\,\mathbf{w} & -\ 12.58 & =0 \\
-1.006\,\mathbf{x} & +\ 13.557\,\mathbf{y} & -\ 13.796\,\mathbf{z} & +\ 50.396\,\mathbf{t} & +\ 81.958\,\mathbf{u} & -\ 0.307\,\mathbf{w} & -\ 17.86 & =0 \\
-37.988\,\mathbf{x} & +\ 41.064\,\mathbf{y} & -\ 31.783\,\mathbf{z} & -\ 0.002\,\mathbf{t} & -\ 0.307\,\mathbf{u} & +\ 25.011\,\mathbf{w} & -\ 120.94 & =0
\end{array}
$$

$$[nn] = 796.07$$

$$
\begin{array}{rrl}
21.780\,\mathbf{t} & +\ 35.167\,\mathbf{u} & -\ 15.78 = 0 \\
35.167\,\mathbf{t} & +\ 56.844\,\mathbf{u} & -\ 25.84 = 0
\end{array}
$$

$$[nn] = 20.02$$

8. *Athens Meridian.*

$$
\begin{array}{rrrrrrrl}
38.000\,\mathbf{x} & -\ 1.865\,\mathbf{y} & +\ 21.565\,\mathbf{z} & +\ 0.000\,\mathbf{t} & +\ 0.330\,\mathbf{u} & -\ 11.854\,\mathbf{w} & +\ 257.30 & =0 \\
-1.865\,\mathbf{x} & +\ 53.921\,\mathbf{y} & -\ 0.005\,\mathbf{z} & +\ 0.097\,\mathbf{t} & +\ 0.996\,\mathbf{u} & +\ 2.379\,\mathbf{w} & -\ 170.98 & =0 \\
21.565\,\mathbf{x} & -\ 0.005\,\mathbf{y} & +\ 22.935\,\mathbf{z} & -\ 2.405\,\mathbf{t} & -\ 3.205\,\mathbf{u} & -\ 6.502\,\mathbf{w} & +\ 131.85 & =0 \\
0.000\,\mathbf{x} & +\ 0.097\,\mathbf{y} & -\ 2.405\,\mathbf{z} & +\ 38.000\,\mathbf{t} & +\ 58.062\,\mathbf{u} & -\ 0.032\,\mathbf{w} & -\ 70.70 & =0 \\
0.330\,\mathbf{x} & +\ 0.996\,\mathbf{y} & -\ 3.205\,\mathbf{z} & +\ 58.062\,\mathbf{t} & +\ 90.252\,\mathbf{u} & -\ 0.123\,\mathbf{w} & -\ 107.04 & =0 \\
-11.854\,\mathbf{x} & +\ 2.379\,\mathbf{y} & -\ 6.502\,\mathbf{z} & -\ 0.032\,\mathbf{t} & -\ 0.123\,\mathbf{u} & +\ 3.758\,\mathbf{w} & -\ 85.77 & =0
\end{array}
$$

$$[nn] = 2543.616$$

We have here to combine eight systems of equations containing in strictness twelve unknown quantities, viz: the **x**, **y**, **z**, **w**, common to all, the two **v**'s for the micrometers of the Santiago and Cape equatorials, and the different values for both **t** and **u** in three several systems. The observations with the Greenwich equatorial were made by pointing to the estimated center; so that the unknown corrections to the measured semidiameter find no expression in the final corresponding equations. With the Santiago, Washington, and Cape Equatorials, and the Cape Mural, both limbs were regularly observed; so that the quantities **t** and **u** are here fully eliminated. There remain the measures with the Meridian-circles at Greenwich and Athens, and with the Cambridge Equatorial. But the impossibility of eliminating the influence of both **t** and **u** from the Greenwich meridian observations was, from the beginning, so palpable that only one has been introduced into the equations of condition. Our unknown quantities are thus reduced to eleven, and, of course, the first object is to diminish this number as far as possible.

The details and unsatisfactory issue of the attempt to discriminate between the influences which affect the measured diameters will be set forth in another place. For the present purpose it will suffice to say that the effort was utterly futile for every one of our planet-series, and that each new endeavor furnished only a new illustration of the impossibility of any such discrimination with the materials now in our hands. Most of the solutions furnished by the additional equations—whether these were independently discussed, or taken in connection with the fundamental equations containing terms dependent upon the same values—were illusory plays with figures; and those concerning which such an expression would be too strong were clearly entitled to no confidence. After much labor devoted to this end the quantity **u** was finally ignored in all the equations, thus diminishing the number of unknown quantities by two.

The Cambridge additional equations for semidiameter gave the values—

$$\mathbf{t} = -8''.583, \quad \mathbf{u} = +5''.823,$$

or, after putting $\mathbf{u} = 0$,

$$\mathbf{t} = +0''.7245,$$

which latter value may be substituted in the Cambridge equations.

Finally, in order to reduce the number of unknown quantities still farther, if possible, and for the sake of a general survey of the character of our materials, all the equations, excepting those derived from the Athens observations, were combined into one set containing seven unknown quantities, by simple addition of the analogous equations in each system. The solution afforded an indication of the admirable precision of Mr. Maclear's measurement of his micrometer-screw, the quantity $\mathbf{v}_2$ (100 times the correction to his adopted value) coming out as zero. The resultant values of $\mathbf{x}$, $\mathbf{y}$, $\mathbf{z}$ and $\mathbf{w}$ being substituted in the equation containing $[ff]$ in the Cape Equatorial series, this equation becomes—

$$1509''.463\ \mathbf{v}_2 = +0''.402$$
$$\mathbf{v}_2 = +0''.000266$$

which authorizes us to dispense with any farther consideration of this term.

For the Santiago Equatorial this solution gave $\mathbf{v}_1 = +0''.570$
for the Greenwich Circle, $\mathbf{t}_1 = +0''.166$
and for the Athens Circle, $\mathbf{t}_2 = +1''.927$.

Considering these last quantities as still undetermined, we have but seven unknown quantities remaining, and our equations containing $\mathbf{w}$ assume the annexed form, which we may consider fundamental.

FUNDAMENTAL EQUATIONS FOR MARS I.

Santiago Equatorial	245.980 x	+ 50.301 y	+ 66.012 z		− 65.862 v	+ 322.302 w	+ 195.44	= 0
Washington Equatorial . . .	93.950 x	− 92.428 y	+ 100.243 z			− 36.292 w	+ 329.73	= 0
Cape of Good Hope Equatorial .	156.410 x	− 114.932 y	+ 75.039 z			+ 221.511 w	+ 510.68	= 0
Cape of Good Hope Meridian .	46.000 x	− 29.619 y	+ 21.694 z			+ 64.792 w	+ 130.97	= 0
Greenwich Equatorial	20.200 x	− 5.291 y	+ 4.297 z			− 16.548 w	− 1.00	= 0
Greenwich Meridian	24.000 x	+ 4.677 y	+ 26.950 z	+ 17.000 $\mathbf{t}_1$		− 14.584 w	− 11.50	= 0
Cambridge Equatorial	60.080 x	− 59.593 y	+ 47.431 z			− 37.988 w	+ 176.26	= 0
Athens Meridian	38.000 x	− 1.865 y	+ 21.565 z	+ 0.000 $\mathbf{t}_2$		− 11.854 w	+ 257.30	= 0

Santiago Equatorial	50.301 x	+ 165.077 y	+ 39.811 z		+ 16.342 v	+ 39.760 w	− 470.31	= 0
Washington Equatorial	− 92.428 x	+ 250.553 y	− 211.748 z			+ 39.342 w	− 616.86	= 0
Cape of Good Hope Equatorial .	− 114.932 x	+ 187.576 y	− 103.827 z			− 169.220 w	− 561.35	= 0
Cape of Good Hope Meridian .	− 29.619 x	+ 54.230 y	− 30.617 z			− 43.931 w	− 170.00	= 0
Greenwich Equatorial	− 5.291 x	+ 10.749 y	− 5.903 z			+ 5.911 w	− 16.64	= 0
Greenwich Meridian	4.677 x	+ 67.389 y	+ 8.152 z	+ 2.944 $\mathbf{t}_1$		+ 0.894 w	− 139.70	= 0
Cambridge Equatorial	− 59.593 x	+ 118.579 y	− 96.401 z			+ 41.064 w	− 277.99	= 0
Athens Meridian	− 1.865 x	+ 53.921 y	− 0.005 z	+ 0.097 $\mathbf{t}_2$		+ 2.379 w	− 170.98	= 0

Santiago Equatorial	66.012 x	+ 39.811 y	+ 32.841 z		− 17.828 v	+ 80.599 w	− 48.93	= 0
Washington Equatorial	100.243 x	− 211.748 y	+ 222.347 z			− 40.298 w	+ 498.27	= 0
Cape of Good Hope Equatorial .	75.039 x	− 103.827 y	+ 69.424 z			+ 106.929 w	+ 316.13	= 0
Cape of Good Hope Meridian . .	21.694 x	− 30.617 y	+ 21.778 z			+ 30.783 w	+ 93.80	= 0
Greenwich Equatorial	4.297 x	− 5.903 y	+ 3.290 z			− 4.382 w	+ 5.02	= 0
Greenwich Meridian	26.950 x	+ 8.152 y	+ 58.878 z	+ 9.015 $\mathbf{t}_1$		− 14.748 w	− 64.67	= 0
Cambridge Equatorial	47.431 x	− 96.401 y	+ 80.976 z			− 31.783 w	+ 220.35	= 0
Athens Meridian	21.565 x	− 0.005 y	+ 22.935 z	− 2.405 $\mathbf{t}_2$		− 6.502 w	+ 131.85	= 0

Fundamental Equations for Mars I—Continued.

Greenwich Meridian	$17.000\,x + 2.944\,y + 9.015\,z + 19.000\,t_1 - 10.854\,w + 6.80 =$
Athens Meridian	$0.000\,x + 0.097\,y - 2.405\,z + 38.000\,t_2 - 0.032\,w - 70.70 =$

Santiago Equatorial	$-65.862\,x + 16.342\,y - 17.828\,z + 448.187\,v - 90.420\,w - 350.49 =$

Santiago Equatorial	$322.302\,x + 39.760\,y + 80.599\,z - 90.420\,v + 427.058\,w + 344.76 = 0$
Washington Equatorial	$-36.292\,x + 39.342\,y - 40.298\,z + 14.215\,w - 135.85 = 0$
Cape of Good Hope Equatorial	$221.511\,x - 169.220\,y + 106.929\,z + 314.688\,w + 738.93 = 0$
Cape of Good Hope Meridian	$64.792\,x - 43.931\,y + 30.783\,z + 91.590\,w + 191.60 = 0$
Greenwich Equatorial	$-16.548\,x + 5.911\,y - 4.382\,z + 14.102\,w - 1.72 = 0$
Greenwich Meridian	$-14.584\,x + 0.894\,y - 14.748\,z - 10.854\,t_1 + 9.150\,w - 3.41 = 0$
Cambridge Equatorial	$-37.988\,x + 41.064\,y - 31.783\,z + 25.011\,w - 120.94 = 0$
Athens Meridian	$-11.854\,x + 2.379\,y - 6.502\,z - 0.032\,t_2 + 3.758\,w - 85.77 = 0$

Santiago Equatorial	$[nn] = 2126.19$
Washington Equatorial	$[nn] = 2074.59$
Cape of Good Hope Equatorial	$[nn] = 2136.65$
Cape of Good Hope Meridian	$[nn] = 734.81$
Greenwich Equatorial	$[nn] = 51.77$
Greenwich Meridian	$[nn] = 399.63$
Cambridge Equatorial	$[nn] = 796.07$
Athens Meridian	$[nn] = 2543.616$

B. FINAL EQUATIONS FOR MARS II.

Santiago Equatorial.

$$382.780\,x - 10.810\,y + 282.426\,z - 39.190\,t - 52.755\,u + 43.496\,v + 428.443\,w + 282.85 = 0$$
$$-10.810\,x + 706.048\,y - 17.993\,z + 73.772\,t + 99.189\,u + 66.929\,v - 30.833\,w - 2522.29 = 0$$
$$282.426\,x - 17.993\,y + 351.303\,z - 55.780\,t - 74.910\,u + 76.240\,v + 294.189\,w - 6.08 = 0$$
$$-39.190\,x + 73.772\,y - 55.780\,z + 39.190\,t + 52.755\,u - 0.161\,v - 41.534\,w - 256.66 = 0$$
$$-52.755\,x + 99.189\,y - 74.910\,z + 52.755\,t + 71.029\,u - 0.650\,v - 55.928\,w - 345.77 = 0$$
$$43.496\,x + 66.929\,y + 76.240\,z - 0.161\,t - 0.650\,u + 798.415\,v + 38.430\,w - 526.79 = 0$$
$$428.443\,x - 30.833\,y + 294.189\,z - 41.534\,t - 55.928\,u + 38.430\,v + 483.588\,w + 423.46 = 0$$

$$[nn] = 10250.67$$

$$313.620\,t + 427.593\,u - 310.36 = 0$$
$$427.593\,t + 588.809\,u - 428.79 = 0$$

$$[nn] = 351.76$$

Santiago Meridian.

$$79.000\,x + 8.531\,y + 50.052\,z + 5.000\,t + 6.807\,u + 90.340\,w - 3.720 = 0$$
$$8.531\,x + 125.129\,y + 15.168\,z + 22.839\,t + 29.414\,u + 4.037\,w - 516.879 = 0$$
$$50.052\,x + 15.168\,y + 57.164\,z - 4.786\,t - 6.765\,u + 52.975\,w - 50.617 = 0$$
$$5.000\,x + 22.839\,y - 4.786\,z + 79.000\,t + 108.283\,u + 6.160\,w - 165.798 = 0$$
$$6.807\,x + 29.414\,y - 6.765\,z + 108.283\,t + 149.787\,u + 8.501\,w - 217.846 = 0$$
$$90.340\,x + 4.037\,y + 52.975\,z + 6.160\,t + 8.501\,u + 104.174\,w + 21.056 = 0$$

$$[nn] = 2675.76$$

Supplementary.

$$27.000\,x - 3.648\,y + 19.715\,z - 1.000\,t - 0.765\,u + 30.768\,w + 11.200 = 0$$
$$-3.648\,x + 49.286\,y + 0.118\,z + 8.346\,t + 11.133\,u - 5.949\,w - 170.945 = 0$$
$$19.715\,x + 0.118\,y + 25.951\,z - 6.669\,t - 8.887\,u + 20.674\,w - 19.874 = 0$$
$$-1.000\,x + 8.346\,y - 6.669\,z + 27.000\,t + 37.051\,u - 0.424\,w - 26.800 = 0$$
$$-0.765\,x + 11.133\,y - 8.887\,z + 37.051\,t + 51.333\,u + 0.153\,w - 34.196 = 0$$
$$30.768\,x - 5.949\,y + 20.674\,z - 0.424\,t + 0.153\,u + 35.383\,w + 21.904 = 0$$

$$[nn] = 793.80$$

Washington Equatorial.

$$12.380\,\mathbf{x} - 0.063\,\mathbf{y} + 0.243\,\mathbf{z} - 5.226\,\mathbf{w} + 17.20 = 0$$
$$-0.063\,\mathbf{x} + 0.603\,\mathbf{y} - 0.043\,\mathbf{z} + 0.099\,\mathbf{w} - 0.39 = 0$$
$$0.243\,\mathbf{x} - 0.043\,\mathbf{y} + 0.008\,\mathbf{z} - 0.108\,\mathbf{w} + 0.37 = 0$$
$$-5.226\,\mathbf{x} + 0.099\,\mathbf{y} - 0.108\,\mathbf{z} + 2.215\,\mathbf{w} - 7.29 = 0$$

$$[nn] = 25.51$$

$$17.220\,\mathbf{t} + 25.736\,\mathbf{u} - 42.817 = 0$$
$$25.736\,\mathbf{t} + 38.463\,\mathbf{u} - 63.981 = 0$$

$$[nn] = 107.066$$

Cape of Good Hope Meridian.

$$46.000\,\mathbf{x} - 6.618\,\mathbf{y} + 16.550\,\mathbf{z} + 55.192\,\mathbf{w} + 29.180 = 0$$
$$-6.618\,\mathbf{x} + 41.365\,\mathbf{y} - 9.743\,\mathbf{z} - 8.399\,\mathbf{w} - 156.136 = 0$$
$$16.550\,\mathbf{x} - 9.743\,\mathbf{y} + 12.107\,\mathbf{z} + 19.024\,\mathbf{w} + 27.336 = 0$$
$$55.192\,\mathbf{x} - 8.399\,\mathbf{y} + 19.024\,\mathbf{z} + 66.398\,\mathbf{w} + 38.773 = 0$$

$$[nn] = 632.69$$

Greenwich Meridian.

$$36.000\,\mathbf{x} + 29.646\,\mathbf{y} + 37.068\,\mathbf{z} - 21.216\,\mathbf{w} - 83.70 = 0$$
$$29.646\,\mathbf{x} + 92.658\,\mathbf{y} + 55.541\,\mathbf{z} - 13.367\,\mathbf{w} - 309.97 = 0$$
$$37.068\,\mathbf{x} + 55.541\,\mathbf{y} + 73.226\,\mathbf{z} - 19.344\,\mathbf{w} - 217.38 = 0$$
$$-21.216\,\mathbf{x} - 13.367\,\mathbf{y} - 19.344\,\mathbf{z} + 12.809\,\mathbf{w} + 32.08 = 0$$

$$[nn] = 1221.95$$

Kremsmünster Meridian.

$$13.000\,\mathbf{x} + 14.104\,\mathbf{y} + 10.118\,\mathbf{z} + 6.638\,\mathbf{w} - 32.500 = 0$$
$$14.104\,\mathbf{x} + 25.300\,\mathbf{y} + 18.096\,\mathbf{z} + 6.448\,\mathbf{w} - 69.529 = 0$$
$$10.118\,\mathbf{x} + 18.096\,\mathbf{y} + 13.944\,\mathbf{z} + 4.635\,\mathbf{w} - 53.038 = 0$$
$$6.638\,\mathbf{z} + 6.448\,\mathbf{y} + 4.635\,\mathbf{z} + 3.447\,\mathbf{w} - 14.028 = 0$$

$$[nn] = 303.509$$

In this series we have seven systems of equations, if we retain the supplementary ones from the Santiago Meridian-circle as a distinct group by themselves, which is for the present the best course. These seven systems contain nine unknown quantities, viz: $\mathbf{x}$, $\mathbf{y}$, $\mathbf{z}$, $\mathbf{w}$ in all the equations; $\mathbf{t}$, $\mathbf{u}$, $\mathbf{v}$ in those from the Equatorial at Santiago; $\mathbf{t}_2$, $\mathbf{u}_2$ in those from the meridian-circle at the same place.

The quantities depending upon the unknown corrections to the semidiameter are already eliminated from the Washington observations, owing to the uniform observance of the rule always to compare both limbs of the planet with the comparison-star. Had other observers pursued the same course much labor and embarrassment might have been avoided. At the Cape of Good Hope, Greenwich, and Kremsmünster, the center was estimated by the observer.

In consequence of the considerations intimated when considering the final equations for *Mars* I, the quantities $\mathbf{u}_1$, $\mathbf{u}_2$ may be removed from all equations in which they occur, and the number of unknown quantities be thus reduced to seven. In the experimental solution, however, the correction of the semidiameter $\mathbf{t} = +\,0''.98960$, deduced from the additional equations for the Santiago Equatorial, was substituted, and both the quantities $\mathbf{t}_2$ and $\mathbf{u}_2$ retained in the equations to be solved; these latter being formed by simple addition of the correlative equations in each of the groups, excepting the one derived from Kremsmünster observations. This solution gave—

$$\mathbf{v}_1 = +\,0''.493$$
$$\mathbf{t}_2 = +\,4''.63322$$
$$\mathbf{u}_2 = -\,2''.57824$$

or after making $\mathbf{u}_2 = 0$

$$\mathbf{t}_2 = +\,1''.09704$$

Not substituting these values, but retaining the terms containing them for the sake of a value of **v** to be deduced from the totality of the Santiago Equatorial observations, and in hopes of arriving at some safer values of $\mathbf{t}_1$ and $\mathbf{t}_2$, we have, as our fundamental equations—

Fundamental Equations for Mars II.

	x	y	z	t	v	w		
Santiago Equatorial	382.780 x	− 10.810 y	+ 282.426 z	− 39.190 t_1	+ 43.496 v	+ 428.443 w	+ 282.85	= 0
Santiago Meridian	79.000 x	+ 8.531 y	+ 50.052 z	+ 5.000 t_2		+ 90.340 w	− 3.720	= 0
Santiago Meridian (suppl.) . .	27.000 x	− 3.684 y	+ 19.715 z	− 1 000 t_2		+ 30.768 w	+ 11.200	= 0
Washington Equatorial . . .	12.380 x	− 0.063 y	+ 0.243 z			− 5.226 w	+ 17.20	= 0
Cape of Good Hope Meridian .	46.000 x	− 6.618 y	+ 16.550 z			+ 55.192 w	+ 29.180	= 0
Greenwich Meridian	36.000 x	+ 29.646 y	+ 37.068 z			− 21.216 w	− 83.70	= 0
Kremsmünster Meridian . . .	13.000 x	+ 14.104 y	+ 10.118 z			+ 6.638 w	− 32.500	= 0
Santiago Equatorial	− 10.810 x	+ 706.048 y	− 17.993 z	+ 73.772 t_1	+ 66.929 v	− 30.833 w	− 2522.29	= 0
Santiago Meridian	8.531 x	+ 125.129 y	+ 15.168 z	+ 22.839 t_2		+ 4.037 w	− 516.879	= 0
Santiago Meridian (suppl.) . .	− 3.648 x	+ 49.286 y	+ 0.118 z	+ 8.346 t_2		− 5.949 w	− 170.945	= 0
Washington Equatorial . . .	− 0.063 x	+ 0.603 y	− 0.043 z			+ 0.099 w	− 0.39	= 0
Cape of Good Hope Meridian .	− 6.618 x	+ 41.365 y	− 9.743 z			− 8.399 w	− 156.136	= 0
Greenwich Meridian	29.646 x	+ 92.658 y	+ 55.541 z			− 13.367 w	− 309.97	= 0
Kremsmünster Meridian . . .	14.104 x	+ 25.300 y	+ 18.096 z			+ 6.448 w	− 69.529	= 0
Santiago Equatorial	282.426 x	− 17.993 y	+ 351.303 z	− 55.780 t^1	+ 76.240 v	+ 294.189 w	− 6.08	= 0
Santiago Meridian	50.052 x	+ 15.168 y	+ 57.164 z	− 4.786 t_2		+ 52.975 w	− 50.617	= 0
Santiago Meridian (suppl.) . .	19.715 x	+ 0.118 y	+ 25.951 z	− 6.669 t_2		+ 20.674 w	− 19.874	= 0
Washington Equatorial . . .	0.243 x	− 0.043 y	+ 0.008 z			− 0.108 w	+ 0.37	= 0
Cape of Good Hope Meridian .	16.550 x	− 9.743 y	+ 12.107 z			+ 19.024 w	+ 27.336	= 0
Greenwich Meridian	37.068 x	+ 55.541 y	+ 73.226 z			− 19.344 w	− 217.38	= 0
Kremsmünster Meridian . . .	10.118 x	+ 18.096 y	+ 13.944 z			+ 4.635 w	− 53.038	= 0
Santiago Equatorial	− 39.190 x	+ 73.772 y	− 55.780 z	+ 39.190 t_1	− 0.161 v	− 41.534 w	− 256.66	= 0
Santiago Meridian	5.000 x	+ 22.839 y	− 4.786 z	+ 79.000 t_2		+ 6.160 w	− 165.798	= 0
Santiago Meridian (suppl.) . .	− 1.000 x	+ 8.346 y	− 6.669 z	+ 27.000 t_2		− 0.424 w	− 26.800	= 0
Santiago Equatorial	43.496 x	+ 66.929 y	+ 76.240 z	− 0.161 t_1	+ 798.415 v	+ 38.430 w	+ 526.79	= 0
Santiago Equatorial	428.443 x	− 30.833 y	+ 294.189 z	− 41.534 t_1	+ 38.430 v	+ 483.588 w	+ 423.46	= 0
Santiago Meridian	90.340 x	+ 4.037 y	+ 52.975 z	+ 6.160 t_2		+ 104.174 w	+ 21.056	= 0
Santiago Meridian (suppl.) . .	30.768 x	− 5.949 y	+ 20.674 z	− 0.424 t_2		+ 35.383 w	+ 21.904	= 0
Washington Equatorial . . .	− 5.226 x	+ 0.099 y	− 0.108 z			+ 2.215 w	− 7.29	= 0
Cape of Good Hope Meridian .	55.192 x	− 8.399 y	+ 19.024 z			+ 66.398 w	+ 38.773	= 0
Greenwich Meridian	− 21.216 x	− 13.367 y	− 19.344 z			+ 12.809 w	+ 32.06	= 0
Kremsmünster Meridian . . .	6.638 x	+ 6.448 y	+ 4.635 z			+ 3.447 w	+ 14.028	= 0

Santiago Equatorial	[nn] = 10250.67
Santiago Meridian	[nn] = 2675.76
Santiago Meridian (suppl.)	[nn] = 793.80
Washington Equatorial	[nn] = 25.51
Cape of Good Hope Meridian	[nn] = 632.69
Greenwich Meridian	[nn] = 1221.95
Kremsmünster Meridian	[nn] = 303.59

FINAL EQUATIONS FOR VENUS I.

Santiago Equatorial.

$$
\begin{aligned}
47.710\,x - 74.402\,y + 380.398\,z + 60.450\,t + 124.493\,u + 243.687\,v + 272.519\,w - 138.99 &= 0 \\
-74.402\,x + 950.347\,y - 140.582\,z - 390.393\,t - 908.597\,u - 123.942\,v - 51.518\,w - 1004.41 &= 0 \\
380.398\,x - 140.582\,y + 788.860\,z + 133.072\,t + 251.694\,u + 267.689\,v + 361.892\,w - 192.10 &= 0 \\
60.450\,x - 390.393\,y + 133.072\,z + 233.110\,t + 572.369\,u + 59.014\,v + 44.349\,w + 331.68 &= 0 \\
124.493\,x - 908.597\,y + 251.694\,z + 572.369\,t + 1452.215\,u + 108.546\,v + 92.717\,w + 737.43 &= 0 \\
243.687\,x - 123.942\,y + 267.689\,z + 59.014\,t + 108.546\,u + 1155.576\,v + 295.185\,w - 521.47 &= 0 \\
272.519\,x - 51.518\,y + 361.892\,z + 44.349\,t + 92.717\,u + 295.185\,v + 320.140\,w - 165.46 &= 0
\end{aligned}
$$

$$[nn] = 2219.21$$

$$
\begin{aligned}
13.480\,t + 24.601\,u - 14.176 &= 0 \\
24.601\,t + 44.923\,u - 25.824 &= 0
\end{aligned}
$$

$$[nn] = 15.725$$

$$
\begin{aligned}
41.680\,t + 94.203\,u - 20.099 &= 0 \\
94.203\,t + 224.107\,u - 42.479 &= 0
\end{aligned}
$$

$$[nn] = 20.654$$

Santiago Meridian.

$$
\begin{aligned}
70.000\,x - 9.090\,y + 89.606\,z + 4.000\,t + 9.127\,u + 33.092\,w + 218.200 &= 0 \\
-9.090\,x + 224.002\,y - 22.218\,z - 111.434\,t - 259.728\,u + 17.679\,w - 341.171 &= 0 \\
89.606\,x - 22.218\,y + 179.593\,z + 7.351\,t + 10.490\,u + 34.705\,w + 327.173 &= 0 \\
4.000\,x - 111.434\,y + 7.351\,z + 70.000\,t + 183.073\,u - 10.780\,w + 169.480 &= 0 \\
9.127\,x - 259.728\,y + 10.490\,z + 183.073\,t + 503.095\,u - 27.890\,w + 391.085 &= 0 \\
33.092\,x + 17.679\,y + 34.705\,z - 10.780\,t - 27.890\,u + 19.258\,w + 73.701 &= 0
\end{aligned}
$$

$$[nn] = 1425.070$$

$$
\begin{aligned}
35.000\,t + 92.619\,u + 18.125 &= 0 \\
92.619\,t + 260.040\,u + 47.560 &= 0
\end{aligned}
$$

$$[nn] = 18.513$$

Washington Equatorial.

$$
\begin{aligned}
51.700\,x - 57.540\,y + 84.506\,z - 94.753\,w - 73.58 &= 0 \\
-57.540\,x + 211.264\,y - 135.640\,z + 94.506\,w - 117.64 &= 0 \\
84.506\,x - 135.640\,y + 173.963\,z - 142.839\,w - 77.93 &= 0 \\
-94.573\,x + 94.506\,y - 142.839\,z + 177.887\,w + 145.10 &= 0
\end{aligned}
$$

$$[nn] = 829.18$$

$$
\begin{aligned}
39.910\,t + 95.671\,u - 45.889 &= 0 \\
95.671\,t + 233.684\,u - 105.478 &= 0
\end{aligned}
$$

$$[nn] = 87.586$$

Greenwich Meridian.

$$
\begin{aligned}
17.000\,x + 8.781\,y + 32.410\,z + 9.000\,t - 38.509\,w + 39.92 &= 0 \\
8.781\,x + 81.024\,y + 18.684\,z + 5.797\,t - 16.205\,w - 101.30 &= 0 \\
32.410\,x + 18.684\,y + 91.178\,z + 8.002\,t - 59.682\,w + 23.00 &= 0 \\
9.000\,x + 5.797\,y + 8.002\,z + 15.000\,t - 23.624\,w + 32.48 &= 0 \\
-38.509\,x - 16.205\,y - 59.682\,z - 23.624\,t + 94.306\,w - 122.40 &= 0
\end{aligned}
$$

$$[nn] = 435.60$$

Altona Meridian.

$$
\begin{aligned}
2.000\,x + 4.564\,y + 4.174\,z - 3.974\,w - 2.500 &= 0 \\
4.564\,x + 10.434\,y + 9.561\,z - 9.058\,w - 5.935 &= 0 \\
4.174\,x + 9.561\,y + 8.777\,z - 8.273\,w - 5.637 &= 0 \\
-3.974\,x - 9.058\,y - 8.273\,z + 7.905\,w + 4.833 &= 0
\end{aligned}
$$

$$[nn] = 5.77$$

We have here five systems of equations, if we choose to count the groups furnished by two observations at Altona, which are given for the sake of completeness and which appear to be of high excellence, although the details of the reduction are wanting. The number of unknown quantities is brought down from ten to eight by rejection of the terms containing **u**. The solution of the additional equations for semidiameters, (those from direct and those from indirect measurements being combined,) gives for the Santiago Equatorial $\mathbf{t} = + 0''.6214$, if we assume $\mathbf{u}_1 = 0$. Under the same circumstances the meridian-circle at Santiago gives $\mathbf{t}_2 = - 0''.5179$. This last value, being negative, was so unexpected that it seemed desirable to incorporate with it the corresponding value deduced from observations at the other conjunction. By the *Venus* II series of measurements $\mathbf{t} = - 0''.2868$ when $\mathbf{u} = 0$; and the combination of the results according to the weights, gave $\mathbf{t} = - 0''.3879$, which value was introduced into the system of equations. Our unknown quantities are thus reduced to six, and for the experimental combination and solution, which gave—

$$\mathbf{v} = + 0''.595,$$

the **t** of the Greenwich group was disregarded.

We have then the annexed fundamental equations, which contain only four unknown quantities besides the Santiago and Greenwich **t**.

Fundamental Equations for Venus I.

Santiago Equatorial	247.710 x	− 74.402 y	+ 380.398 z		+ 243.687 v	+ 272.519 w	− 101.43	= 0
Santiago Meridian	70.000 x	− 9.090 y	+ 89.606 z			+ 33.092 w	+ 216.648	= 0
Washington Equatorial . . .	51.700 x	− 57.540 y	+ 84.506 z			− 94.753 w	− 73·58	= 0
Greenwich Meridian	17.000 x	+ 8.781 y	+ 32.410 z	+ 9.000 t		− 38.509 w	+ 39.92	= 0
Altona Meridian	2.000 x	+ 4.564 y	+ 4.174 z			− 3.974 w	− 2.500	= 0
Santiago Equatorial	− 74.402 x	+ 950.347 y	− 140.582 z		− 123.942 v	− 51.518 w	− 1246.99	= 0
Santiago Meridian	− 9.090 x	+ 224.002 y	− 22.218 z			+ 17.679 w	− 297.917	= 0
Washington Equatorial . . .	− 57.540 x	+ 211.264 y	− 135.610 z			+ 94.506 w	− 117.64	= 0
Greenwich Meridian	8.781 x	+ 81.024 y	+ 18.684 z	+ 5.797 t		− 16.205 w	− 101.30	= 0
Altona Meridian	4.564 x	+ 10.434 y	+ 9.561 z			− 9.058 w	− 5.935	= 0
Santiago Equatorial	380.398 x	− 140.582 y	+ 788.860 z		+ 267.689 v	+ 361.892 w	− 109.41	= 0
Santiago Meridian	89.606 x	− 22.218 y	+ 179.593 z			+ 34.705 w	+ 324.320	= 0
Washington Equatorial . . .	84.506 x	− 135.640 y	+ 173.963 z			− 142.839 w	− 77.93	= 0
Greenwich Meridian	32.410 x	+ 18.864 y	+ 91.178 z	+ 8.002 t		− 59.682 w	+ 23.00	= 0
Altona Meridian	4.174 x	+ 9.561 y	+ 8.777 z			− 8.273 w	− 5.637	= 0
Greenwich Meridian	9.000 x	+ 5.797 y	+ 8.002 z	+ 15.000 t		− 23.624 w	+ 32.48	= 0
Santiago Equatorial	243.687 x	− 123.942 y	+ 267.689 z		+ 1155.576 v	+ 295.185 w	+ 476.53	= 0
Santiago Equatorial	272.519 x	− 51.518 y	+ 361.892 z		+ 295.185 v	+ 320.140 w	− 137.90	= 0
Santiago Meridian	33.092 x	+ 17.679 y	+ 34.705 z			+ 19.258 w	+ 77.885	= 0
Washington Equatorial . . .	− 94.753 x	+ 94.506 y	− 142.839 z			+ 177.887 w	+ 145.10	= 0
Greenwich Meridian	− 38.509 x	− 16.205 y	− 59.682 z	− 23.624 t		+ 94.306 w	− 122.40	= 0
Altona Meridian	− 3.974 x	− 9.058 y	− 8.273 z			+ 7.905 w	+ 4.833	= 0

Santiago Equatorial	$[nn] = 2763.22$
Santiago Meridian	$[nn] = 1304.06$
Washington Equatorial	$[nn] = 829.18$
Greenwich Meridian.	$[nn] = 435.60$
Altona Meridian	$[nn] = 5.77$

FINAL EQUATIONS FOR VENUS II.

Santiago Equatorial.

$$\begin{aligned}
71.300\,\mathbf{x} + 59.197\,\mathbf{y} + 94.582\,\mathbf{z} + 6.820\,\mathbf{t} + 21.753\,\mathbf{u} + 14.083\,\mathbf{v} + 112.469\,\mathbf{w} + 245.10 &= 0\\
59.197\,\mathbf{x} + 236.451\,\mathbf{y} + 142.054\,\mathbf{z} - 2.387\,\mathbf{t} - 7.595\,\mathbf{u} + 135.098\,\mathbf{v} + 83.492\,\mathbf{w} + 610.18 &= 0\\
94.582\,\mathbf{x} + 142.054\,\mathbf{y} + 191.935\,\mathbf{z} + 0.349\,\mathbf{t} + 1.109\,\mathbf{u} + 39.172\,\mathbf{v} + 132.967\,\mathbf{w} + 430.99 &= 0\\
6.820\,\mathbf{x} - 2.387\,\mathbf{y} + 0.349\,\mathbf{z} + 6.820\,\mathbf{t} + 21.753\,\mathbf{u} - 4.182\,\mathbf{v} + 13.124\,\mathbf{w} - 10.84 &= 0\\
21.753\,\mathbf{x} - 7.595\,\mathbf{y} + 1.109\,\mathbf{z} + 21.753\,\mathbf{t} + 69.405\,\mathbf{u} - 13.217\,\mathbf{v} + 41.859\,\mathbf{w} - 34.44 &= 0\\
14.083\,\mathbf{x} + 135.098\,\mathbf{y} + 39.172\,\mathbf{z} - 4.182\,\mathbf{t} - 13.217\,\mathbf{u} + 238.069\,\mathbf{v} + 21.378\,\mathbf{w} + 276.40 &= 0\\
112.469\,\mathbf{x} + 83.492\,\mathbf{y} + 132.967\,\mathbf{z} + 13.124\,\mathbf{t} + 41.859\,\mathbf{u} + 21.378\,\mathbf{v} + 181.739\,\mathbf{w} + 375.20 &= 0\\
[nn] &= 2168.629
\end{aligned}$$

$$\begin{aligned}
64.700\,\mathbf{t} + 149.230\,\mathbf{u} - 48.898 &= 0\\
149.230\,\mathbf{t} + 355.388\,\mathbf{u} - 102.911 &= 0\\
[nn] &= 110.211
\end{aligned}$$

$$\begin{aligned}
25.960\,\mathbf{t} + 71.843\,\mathbf{u} - 25.463 &= 0\\
71.843\,\mathbf{t} + 202.954\,\mathbf{u} - 71.887 &= 0\\
[nn] &= 30.827
\end{aligned}$$

Santiago Meridian.

$$\begin{aligned}
46.000\,\mathbf{x} + 21.787\,\mathbf{y} + 45.944\,\mathbf{z} + 34.000\,\mathbf{t} + 95.362\,\mathbf{u} + 92.561\,\mathbf{w} + 171.60 &= 0\\
21.787\,\mathbf{x} + 114.854\,\mathbf{y} + 49.873\,\mathbf{z} + 42.029\,\mathbf{t} + 95.486\,\mathbf{u} + 38.404\,\mathbf{w} + 346.53 &= 0\\
45.944\,\mathbf{x} + 49.873\,\mathbf{y} + 85.807\,\mathbf{z} + 30.689\,\mathbf{t} + 71.311\,\mathbf{u} + 77.707\,\mathbf{w} + 183.75 &= 0\\
34.000\,\mathbf{x} + 42.029\,\mathbf{y} + 30.689\,\mathbf{z} + 46.000\,\mathbf{t} + 121.434\,\mathbf{u} + 71.449\,\mathbf{w} + 224.00 &= 0\\
95.362\,\mathbf{x} + 95.486\,\mathbf{y} + 71.311\,\mathbf{z} + 121.434\,\mathbf{t} + 333.002\,\mathbf{u} + 205.774\,\mathbf{w} + 603.21 &= 0\\
92.561\,\mathbf{x} + 38.404\,\mathbf{y} + 77.707\,\mathbf{z} + 71.449\,\mathbf{t} + 205.774\,\mathbf{u} + 192.248\,\mathbf{w} + 357.69 &= 0\\
[nn] &= 1650.24
\end{aligned}$$

$$\begin{aligned}
45.000\,\mathbf{t} + 116.343\,\mathbf{u} + 12.905 &= 0\\
116.343\,\mathbf{t} + 312.751\,\mathbf{u} + 45.095 &= 0\\
[nn] &= 41.957
\end{aligned}$$

Washington Equatorial.

$$\begin{aligned}
13.560\,\mathbf{x} - 11.736\,\mathbf{y} + 23.555\,\mathbf{z} - 14.341\,\mathbf{w} + 10.89 &= 0\\
-11.736\,\mathbf{x} + 58.890\,\mathbf{y} - 15.577\,\mathbf{z} + 9.803\,\mathbf{w} + 91.95 &= 0\\
23.555\,\mathbf{x} - 15.577\,\mathbf{y} + 42.367\,\mathbf{z} - 24.950\,\mathbf{w} + 30.18 &= 0\\
-14.341\,\mathbf{x} + 9.803\,\mathbf{y} - 24.950\,\mathbf{z} + 15.362\,\mathbf{w} - 16.66 &= 0\\
[nn] &= 221.76
\end{aligned}$$

$$\begin{aligned}
18.200\,\mathbf{t} + 37.113\,\mathbf{u} - 28.813 &= 0\\
37.113\,\mathbf{t} + 76.065\,\mathbf{u} - 60.112 &= 0\\
[nn] &= 51.802
\end{aligned}$$

Greenwich Meridian.

$$\begin{aligned}
17.000\,\mathbf{x} + 10.176\,\mathbf{y} + 16.798\,\mathbf{z} - 7.000\,\mathbf{t} - 26.922\,\mathbf{w} + 41.51 &= 0\\
10.176\,\mathbf{x} + 41.987\,\mathbf{y} + 25.943\,\mathbf{z} + 11.168\,\mathbf{t} - 13.274\,\mathbf{w} + 106.32 &= 0\\
16.798\,\mathbf{x} + 25.943\,\mathbf{y} + 40.888\,\mathbf{z} + 4.712\,\mathbf{t} - 19.179\,\mathbf{w} + 73.27 &= 0\\
-7.000\,\mathbf{x} + 11.168\,\mathbf{y} + 4.712\,\mathbf{z} + 17.000\,\mathbf{t} + 13.696\,\mathbf{w} + 13.19 &= 0\\
-26.922\,\mathbf{x} - 13.274\,\mathbf{y} - 19.179\,\mathbf{z} + 13.696\,\mathbf{t} + 45.186\,\mathbf{w} - 60.48 &= 0\\
[nn] &= 313.30
\end{aligned}$$

Cracow Meridian.

$$\begin{aligned}
16.000\,\mathbf{x} - 19.343\,\mathbf{y} + 18.034\,\mathbf{z} - 17.661\,\mathbf{w} + 12.800 &= 0\\
-19.343\,\mathbf{x} + 45.152\,\mathbf{y} - 24.516\,\mathbf{z} + 17.973\,\mathbf{w} + 52.463 &= 0\\
18.034\,\mathbf{x} - 24.516\,\mathbf{y} + 23.921\,\mathbf{z} - 18.502\,\mathbf{w} + 6.448 &= 0\\
-17.661\,\mathbf{x} + 17.973\,\mathbf{y} - 18.502\,\mathbf{z} + 20.332\,\mathbf{w} - 24.859 &= 0\\
[nn] &= 393.62
\end{aligned}$$

This series comprises five systems, of which the one derived from Cracow observations was disqualified for criticism or examination in consequence of the entire absence of the needful

data. All terms containing **n** being rejected, the additional equations for semi-diameter furnish, after combination with those deduced from observations of *Venus I*,

for the Santiago Equatorial, $\mathbf{t} = +\ 0''.7450$

for the Santiago meridian-circle, $\mathbf{t} = -\ 0''.38812$

Substituting these values, we obtain a series of equation systems containing only **x**, **y**, **z**, **w**, **v**, and the **t** for Greenwich. Omitting the latter term, summing the equations, and solving, we obtain—

$$= +\ 0''.534$$

and the fundamental equations are—

FUNDAMENTAL EQUATIONS FOR VENUS II.

Santiago Equatorial	71.300 x	+ 59.197 y	+ 94.582 z		+ 14.083 v	+ 112.469 w	+ 250.254	= 0
Santiago Meridian	46.000 x	+ 21.787 y	+ 45.944 z			+ 92.561 w	+ 158.404	= 0
Washington Equatorial . . .	13.560 x	+ 11.736 y	+ 23.555 z			— 14.341 w	+ 10.89	= 0
Greenwich Meridian	17.000 x	+ 10.176 y	+ 16.798 z	— 7.000 t		— 26.922 w	+ 41.51	= 0
Cracow Meridian	16.000 x	— 19.343 y	+ 18.034 z			— 17.661 w	+ 12.800	= 0
Santiago Equatorial	59.197 x	+ 236.451 y	+ 142.054 z		+ 135.098 v	+ 83.492 w	+ 608.376	= 0
Santiago Meridian	21.787 x	+ 114.854 y	+ 49.873 z			+ 38.404 w	+ 330.217	= 0
Washington Equatorial . . .	— 11.736 x	+ 58.890 y	— 15.577 z			+ 9.803 w	+ 91.95	= 0
Greenwich Meridian	10.176 x	+ 41.987 y	+ 25.943 z	+ 11.168 t		— 13.274 w	+ 106.32	= 0
Cracow Meridian	— 19.343 x	+ 45.152 y	— 24.516 z			+ 17.973 w	+ 52.463	= 0
Santiago Equatorial	94.582 x	+ 142.054 y	+ 191.935 z		+ 39.172 v	+ 132.967 w	+ 431.254	= 0
Santiago Meridian	45.944 x	+ 49.873 y	+ 85.807 z			+ 77.707 w	+ 171.839	= 0
Washington Equatorial . . .	23.555 x	— 15.577 y	+ 42.367 z			— 24.950 w	+ 30.18	= 0
Greenwich Meridian	16.798 x	+ 25.943 y	+ 40.888 z	+ 4.712 t		— 19.179 w	+ 73.27	= 0
Cracow Meridian	18.034 x	— 24.516 y	+ 23.921 z			— 18·502 w	+ 6.448	= 0
Greenwich Meridian	— 7.000 x	+ 11.168 y	+ 4.712 z	+ 17.000 t		+ 13.696 w	+ 13.19	= 0
Santiago Equatorial	14.083 x	+ 135.098 y	+ 39.172 z		+ 238.069 v	+ 21.378 w	— 5.686	= 0
Santiago Equatorial	112.469 x	+ 83.492 y	+ 132.967 z		+ 21.378 v	+ 181.379 w	+ 385.119	= 0
Santiago Meridian	92.561 x	+ 38.404 y	+ 77.707 z			+ 192.248 w	+ 329.959	= 0
Washington Equatorial . . .	— 14.341 x	+ 9.803 y	— 24.950 z			+ 15.362 w	— 16.66	= 0
Greenwich Meridian	— 26.922 x	— 13.274 y	— 19.179 z	+ 13.696 t		+ 45.186 w	— 60.48	= 0
Cracow Meridian	— 17.661 x	+ 17.973 y	— 18.502 z			+ 20.332 w	— 24.859	= 0

Santiago Equatorial	[*nn*] = 2146.084
Santiago Meridian	[*nn*] = 1483.29
Washington Equatorial . .	[*nn*] = 221.76
Greenwich Meridian . . .	[*nn*] = 313.30
Cracow Meridian	[*nn*] = 393 62

The values obtained for **v** in these four solutions are quite accordant, and, when combined with one another with due regard to weights, give us the preliminary value—

$$\mathbf{v} = +\ 0''.57.$$

§ 12.—PRELIMINARY SOLUTIONS.

The consideration of the respective weights to be attributed to the groups of observations made by different observers, with different instruments, and at different places, has been postponed until a critical investigation of the mean errors and average discordances should render it possible to deduce a measure of precision from the observations themselves. And since it was clearly evident that at least two solutions of the fundamental equations would thus become imperative, the definite substitution of the values adopted for several of the comparatively unimportant unknown quantities, has been delayed as long as possible. Using now closely approximate determinations of , $\mathbf{y}$, $\mathbf{z}$, and $\mathbf{w}$, these other terms may be deduced with tolerable precision, and their influence then eliminated.

The value of $\mathbf{v}_1 = +\,0''.57$ being adopted and substituted in all the equations derived from the micrometer-observations with the Santiago Equatorial, there remain only the quantities $\mathbf{t}$ for divers instruments, which may be numerically deduced from those equations in each set, which contain terms multiplied by [*dd*]. For some cases this appears the only practical method; in all it is the most convenient. The only exception is furnished by the equations deduced from Santiago equatorial observations;* in these those values of $\mathbf{t}$ have been employed, which result from the combination of all measurements of the semi-diameter made with the instrument either directly or indirectly during both oppositions or conjunctions; so that—

$$\text{for } \textit{Mars}, \quad \mathbf{t} = +\,1''.450$$
$$\text{for } \textit{Venus}, \quad \mathbf{t} = +\,0''.745.$$

In the second Greenwich series of meridian observations of *Mars*, the terms dependent upon the apparent semidiameter do not appear. The other Greenwich series give the following equations:

Mars I.

$$24.000\,\mathbf{x} + 4.677\,\mathbf{y} + 26.950\,\mathbf{z} + 17.000\,\mathbf{t} - 14.584\,\mathbf{w} - 11.50 = 0$$
$$\text{whence } \mathbf{t} = -\,0''.1915.$$

Venus I.

$$17.000\,\mathbf{x} + 8.781\,\mathbf{y} + 32.410\,\mathbf{z} + 9.000\,\mathbf{t} - 38.509\,\mathbf{w} + 39.92 = 0$$
$$\text{whence } \mathbf{t} = -\,2''.9047.$$

Venus II.

$$17.000\,\mathbf{x} + 10.176\,\mathbf{y} + 16.798\,\mathbf{z} - 7.000\,\mathbf{t} - 26.922\,\mathbf{w} + 41.51 = 0$$
$$\text{whence } \mathbf{t} = -\,0''.3231.$$

These values of $\mathbf{t}$ for the Greenwich Circle are, of course, to be substituted in their respective groups of equations.

Finally—inasmuch as sundry discrepancies between the results of the "Supplementary Equations" (derived from meridian comparisons of *Mars* II at Santiago) and those from nearly simultaneous observations with the equatorial, and moreover the large negative values of the corrections to the semidiameter, all seemed to imply some unknown source of discordance—

these supplementary equations were submitted at this stage of the computation to a new scrutiny, and a term introduced containing $\mathbf{v}_3$,—the correction to the adopted value of a revolution of the micrometer-screw in the Santiago Circle.

The "Supplementary Equations" thus assume the following form:

$$\begin{array}{rrrrrrrl}
27.000\,\mathbf{x} & -\ 3.648\,\mathbf{y} & +\ 19.715\,\mathbf{z} & -\ 1.000\,\mathbf{t}_2 & +\ 1.725\,\mathbf{v}_3 & +\ 30.768\,\mathbf{w} & +\ 11''.200 & = 0 \\
-\ 3.648\,\mathbf{x} & +\ 49.286\,\mathbf{y} & +\ 0.118\,\mathbf{z} & +\ 8.346\,\mathbf{t}_2 & +\ 4.428\,\mathbf{v}_3 & -\ 5.949\,\mathbf{w} & -\ 170''.945 & = 0 \\
19.715\,\mathbf{x} & +\ 0.118\,\mathbf{y} & +\ 25.951\,\mathbf{z} & -\ 6.669\,\mathbf{t}_2 & +\ 6.672\,\mathbf{v}_3 & +\ 20.674\,\mathbf{w} & -\ 19''.874 & = 0 \\
-\ 1.000\,\mathbf{x} & +\ 8.346\,\mathbf{y} & -\ 6.669\,\mathbf{z} & +\ 27.000\,\mathbf{t}_2 & +\ 4.287\,\mathbf{v}_3 & -\ 0.424\,\mathbf{w} & -\ 26''.800 & = 0 \\
1.725\,\mathbf{x} & +\ 4.428\,\mathbf{y} & +\ 6.672\,\mathbf{z} & +\ 4.287\,\mathbf{t}_2 & +\ 43.604\,\mathbf{v}_3 & +\ 0.969\,\mathbf{w} & -\ 44''.221 & = 0 \\
30.768\,\mathbf{x} & -\ 5.949\,\mathbf{y} & +\ 20.674\,\mathbf{z} & -\ 0.424\,\mathbf{t}_2 & +\ 0.969\,\mathbf{v}_3 & +\ 35.383\,\mathbf{w} & +\ 21''.904 & = 0
\end{array}$$

and from the fifth equation we obtain by substitution—

$$\mathbf{v}_3 = +\ 0''.3893$$

the substitution of which in the other equations reduces the group to the form:

$$\begin{array}{rrrrrrl}
27.000\,\mathbf{x} & -\ 3.648\,\mathbf{y} & +\ 19.715\,\mathbf{z} & -\ 1.000\,\mathbf{t}_2 & +\ 30.768\,\mathbf{w} & +\ 11''.872 & = 0 \\
-\ 3.648\,\mathbf{x} & +\ 49.286\,\mathbf{y} & +\ 0.118\,\mathbf{z} & +\ 8.346\,\mathbf{t}_2 & -\ 5.949\,\mathbf{w} & -\ 169''.221 & = 0 \\
19.715\,\mathbf{x} & +\ 0.118\,\mathbf{y} & +\ 25.951\,\mathbf{z} & -\ 6.669\,\mathbf{t}_2 & +\ 20.674\,\mathbf{w} & -\ 17''.277 & = 0 \\
-\ 1.000\,\mathbf{x} & +\ 8.346\,\mathbf{y} & -\ 6.669\,\mathbf{z} & +\ 27.000\,\mathbf{t}_2 & -\ 0.424\,\mathbf{w} & -\ 25''.132 & = 0 \\
30.768\,\mathbf{x} & -\ 5.949\,\mathbf{y} & +\ 20.674\,\mathbf{z} & -\ 0.424\,\mathbf{t}_2 & +\ 35.383\,\mathbf{w} & +\ 22''.281 & = 0
\end{array}$$

or, after introducing $\mathbf{t} = 1''.097$, to the finally adopted value for the supplementary equations from the Santiago meridian circle:

$$\begin{array}{rrrrrl}
27.000\,\mathbf{x} & -\ 3.648\,\mathbf{y} & +\ 19.715\,\mathbf{z} & +\ 30.768\,\mathbf{w} & +\ 10''.775 & = 0 \\
-\ 3.648\,\mathbf{x} & +\ 49.286\,\mathbf{y} & +\ 0.118\,\mathbf{z} & -\ 5.949\,\mathbf{w} & -\ 160''.065 & = 0 \\
19.715\,\mathbf{x} & +\ 0.118\,\mathbf{y} & +\ 25.951\,\mathbf{z} & +\ 20.674\,\mathbf{w} & -\ 24''.593 & = 0 \\
30.768\,\mathbf{x} & -\ 5.949\,\mathbf{y} & +\ 20.674 & +\ 35.383\,\mathbf{w} & +\ 21''.816 & = 0
\end{array}$$

The four series of normal equations, thus brought to their ultimate form, now follow, together with the values of the unknown quantities which they afford prior to multiplication by any factor dependent upon the instrument or the observer. The results of this solution furnish an approximate criterion for the relative value of the several series of observations, and we may hence deduce their respective weights. The groups of equations, when multiplied each by its own weight and added anew, will furnish us results as trustworthy as the materials at our disposal permit, and beyond which it would be needless to push the investigation.

MARS I.

Normal Equations.

	Santiago Equatorial.	Washington Equatorial.	Cape G. H. Equatorial.	Cape G. H. Meridian.	Greenwich Equatorial.	Greenwich Meridian.	Cambridge Equatorial.	Athens Meridian.	Tota .
[*aa*]	245.980	93.950	156.410	46.000	20.200	24.000	60.080	38.000	684.620
[*ab*]	50.301	— 92.428	—114.932	— 29.619	— 5.291	4.677	— 59.593	— 1.862	—248.747
[*ac*]	66.012	100.243	75.039	21.694	4.297	26.950	47.431	21.565	363.231
[*ag*]	322.302	— 36.292	221.511	64.792	—16.548	— 14.584	— 37.988	— 11.854	491.339
[*bb*]	165.077	250.553	187.576	54.230	10.749	67.389	118.579	53.921	908.074
[*bc*]	39.811	—211.748	—103.827	— 30.617	— 5.903	8.152	— 96.401	— 0.005	—400.538
[*bg*]	39.760	39.342	—169.220	— 43.931	5.911	0.894	41.064	2.379	— 83.801
[*cc*]	32.841	222.347	69.424	21.778	3.920	58.878	80.976	22.935	513.099
[*cg*]	80.599	— 40.298	106.929	30.783	— 4.382	— 14.748	— 31.783	— 6.502	120.598
[*gg*]	427.058	14.215	314.688	91.590	14.102	9.150	25.011	3.758	899.572
[*an*]	164.590	329.730	510.680	130.970	— 1.000	— 14.760	175.610	257.300	1553.120
[*bn*]	—462.650	—616.860	—561.350	—170.000	16.640	—140.260	—271.610	—170.790	—2410.160
[*cn*]	— 57.280	498.270	316.130	93.800	5.020	— 66.400	213.990	127.240	1139.770
[*gn*]	302.400	—135.850	738.930	191.600	— 1.720	— 1.330	—120.940	— 85.830	887.260
[*nn*]	1896.170	2074.590	2136.650	734.810	52.770	397.230	810.530	2412.140	10514.890

The solution of the equations derived from the last column gave results so extremely discordant from the approximate values already known, that it was found necessary to subject the several individual systems to a preliminary scrutiny, and to deduce their approximate weights by means of equations depending on the equatorial comparisons alone. The three series of meridian observations being provisionally omitted from the sum total, the solution afforded the following values for the unknown quantities and mean errors:

$$\mathbf{x} = -\ 1''.5373 \pm 0''.0896$$
$$\mathbf{y} = +\ 2''.8970 \pm 0''.0626$$
$$\mathbf{z} = +\ 1''.4334 \pm 0''.1021$$
$$\mathbf{w} = -\ 0''.1402 \pm 0''.0619$$

	Santiago Equatorial.	Washington Equatorial.	Cape G. H. Equatorial.	Greenwich Equatorial.	Cambridge Equatorial.	Sum Equat. Comparisons.	Cape G. H. Meridian.	Greenwich Meridian.	Total.	Athens Meridian.
	″	″	″	″	″	″	″	″	″	″
[*nn*]	1896.17	2074.59	2136.65	52.77	810.53	6970.71	734.81	397.23	8102.75	2412.14
[*nn*.4]	169.06	326.68	126.53	89.58	132.50	844.35	137.90	89.58	1071.83	1526.91
ε	± 0.836	± 1.906	± 0.911	± 2.352	± 1.537	± 1.214	± 1.812	± 2.116	—	± 6.701
P.	2.111	0.406	1.776	0.267	0.624	1.000	0.449	0.329	—	0.033

The source of the discordance is thus immediately manifest; and it is evident that in the new solution the Athens observations may be advantageously omitted.

The order of the mean errors thus deduced for the two other meridian series being not essentially different from that of those derived from star-comparisons, and used for this last solution, the weights given above are clearly still applicable to their respective system of equations, and were adopted.

MARS II.

Normal Equations.

	Santiago Equatorial.	Santiago Meridian.	Santiago Meridian, (suppl.)	Washington Equatorial.	Cape G. H. Meridian.	Greenwich Meridian.	Kremsmünster Meridian.	Total.
[aa]	382.780	79.600	27.000	12.380	46.000	36.000	13.000	596.160
[ab]	— 10.810	8.531	— 3.648	— 0.063	— 6.618	29.646	14.104	31.142
[ac]	282.426	50.052	19.715	0.243	16.550	37.068	10.118	416.172
[ag]	428.443	90.340	30.768	— 5.226	55.192	— 21.216	— 6.638	584.939
[bb]	706.048	125.129	49.286	0.603	41.365	92.658	25.300	1040.389
[bc]	— 17.993	15.168	0.118	— 0.043	— 9.743	55.541	18.096	61.144
[bg]	— 30.833	4.037	— 5.949	0.099	— 8.399	— 13.367	— 6.448	— 47.964
[cc]	351.303	57.164	25.951	0.008	12.107	73.226	13.944	533.703
[cg]	294.189	52.975	20.674	— 0.108	19.024	— 19.344	— 4.635	372.045
[gg]	483.588	104.174	35.383	2.215	66.398	12.809	3.447	708.014
[an]	245.026	1.765	10.775	17.200	29.180	— 83.700	—32.500	187.746
[bn]	—2381.387	—491.823	—160.065	— 0.390	—156.136	—309.970	—69.529	—3569.300
[cn]	— 53.201	— 55.867	— 24.503	0.370	27.336	—217.380	—53.038	— 376.373
[gn]	379.791	27.814	21.816	— 7.290	38.773	32.080	14.028	507.012
[nn]	9256.240	2406.860	739.680	25.510	632.690	1221.950	303.510	14586.440

Solving the equations derived from the last column, it became evident that a nearer approach to accuracy would be attainable by the exclusion of the Kremsmünster observations. This being done, the solution gave the values and mean errors thus:

$$\begin{aligned} \mathbf{x} &= -\,1''.7536 \pm 0''.1878 \\ \mathbf{y} &= +\,3''.4538 \pm 0''.0516 \\ \mathbf{z} &= +\,1''.5137 \pm 0''.1069 \\ \mathbf{w} &= +\,0''.1828 \pm 0''.1463 \end{aligned}$$

	Santiago Equatorial.	Santiago Meridian.	Santiago Meridian, (suppl.)	Washington Equatorial.	Cape G. H. Meridian.	Greenwich Meridian.	Total.	Kremsmünster Meridian.
	"	"	"	"	"	"	"	"
[nn]	9256.24	2406.86	739.68	25.21	632.69	1221.95	14282.93	303.51
[nn.4]	638.10	480.45	186.30	8.74	68.57	123.05	1505.21	130.19
ε	± 1.298	± 2.531	± 2.846	± 1.021	± 1.278	± 1.961	± 1.612	± 3.803
P	1.543	0.406	0.321	2.492	1.599	0.676	1.000	0.180

The propriety of the exclusion of the Kremsmünster group is thus vindicated, and the weights thus obtained for the other groups are available for the next solution. The following slightly different weights, obtained from still another solution, were actually employed for the multiplication:

Sant. Equat.	Sant. Merid.	Sant. Merid., (suppl.)	Wash. Equat.	Cape Merid.	Greenwich Merid.
1.539	0.411	0.308	2.526	1.614	0.685

VENUS I.

Normal Equations.

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.	Altona meridian.	Total.
[aa]	247.710	70.000	51.700	17.000	2.000	388.410
[ab]	— 74.402	— 9.090	— 57.540	8.781	4.564	— 127.687
[ac]	380.398	89.606	84.506	32.410	4.174	591.094
[ag]	272.519	33.092	— 94.753	— 38.509	— 3.974	168.375
[bb]	950.347	224.002	211.264	81.024	10.434	1477.071
[bc]	— 140.582	— 22.218	— 135.640	18.684	9.561	— 270.195
[bg]	— 51.518	17.679	94.506	— 16.205	9.058	35.404
[cc]	788.860	179.593	173.963	91.178	8.777	1242.371
[cg]	361.892	34.705	— 142.839	— 59.682	— 8.273	185.803
[gg]	320.140	19.258	177.887	94.306	7.905	619.496
[an]	20.200	216.648	— 73.580	13.778	— 2.500	174.546
[bn]	—1353.320	—297.917	— 117.640	— 118.138	— 5.935	—1892.950
[cn]	32.430	324.320	— 77.930	— 0.242	— 5.637	272.941
[gn]	5.850	77.885	145.100	— 53.780	4.833	179.888
[nn]	2649.000	1304.060	829.180	373.470	5.770	5161.480

The equations constructed from the coefficients in the column of sums furnish the annexed results:

$$\mathbf{x} = -\,0''.1408 \pm 0''.2667$$
$$\mathbf{y} = +\,1''.3134 \pm 0''.0698$$
$$\mathbf{z} = +\,0''.1904 \pm 0''.1439$$
$$\mathbf{w} = -\,0''.3843 \pm 0''.1139$$

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.	Altona meridian.	Total.
	″	″	″	″	″	″
[nn]	2649.00	1304.06	829.18	373.47	5.77	5161.48
[nn.4]	781.76	889.83	661.89	283.13	17.34	2633.50
ε	± 1.791	± 3.671	± 3.725	± 4.667	—	± 2.617
P	2.136	0.508	0.494	0.315	—	1.000

The Altona observations being but two in number,—while four unknown quantities are to be determined,—it is of course impracticable to deduce the measure of their precision from internal evidence. After some little examination, the most appropriate weight seemed to be unity, and they are consequently combined with the other results without modification.

VENUS II.

Normal Equations.

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.	Cracow meridian.	Total.
[ ]	71.300	46.000	13.560	17.000	16.000	163.860
[ab]	59.197	21.787	—11.736	10.176	—19.343	60.081
[ac]	94.582	45.944	23.555	16.798	18.034	198.913
[ag]	112.469	92.561	—14.341	—26.922	—17.661	146.106
[bb]	236.451	114.854	58.890	41.987	45.152	497.334
[bc]	142.054	49.873	—15.577	25.943	—24.516	177.777
[bg]	83.492	38.404	9.803	—13.274	17.973	136.398
[cc]	191.935	85.807	42.367	40.888	23.921	384.918
[cg]	132.967	77.707	—24.950	—19.179	—18.502	148.043
[gg]	181.739	192.248	15.362	45.186	20.332	454.867
[an]	256.780	158.404	10.890	43.771	12.800	482.645
[bn]	671.680	330.217	91.950	102.712	52.463	1249.022
[cn]	449.600	171.839	30.180	71.748	6.448	729.815
[gn]	394.990	329.959	—16.660	—64.901	—24.859	618.526
[nn]	2463.501	1483.290	221.760	306.552	393.620	4868.723

After one solution, the weight of the Cracow group was seen to be of a different order from the weights of the other series, and the results of these Cracow observations were consequently excluded. Solving anew, the following values were deduced, fully justifying the rejection:

$$\begin{aligned}
\mathbf{x} &= -\,2''.6392 \pm 0''.3711\\
\mathbf{y} &= -\,2''.5401 \pm 0''.1265\\
\mathbf{z} &= +\,0''.7759 \pm 0''.2192\\
\mathbf{w} &= -\,0''.1066 \pm 0''.1470
\end{aligned}$$

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.	Total.	Cracow meridian.
	″	″	″	″	″	″
[nn]	2463.50	1483.29	221.76	306.55	4556.88	393.62
[nn.4]	457.10	248.60	56.59	46.30	808.59	258.54
ε	± 2.606	± 2.433	± 2.432	± 1.887	± 2.371	± 4.642
P	0.828	0.950	0.950	1.578	1.000	0.261

The following weights, which differ but little from these, and resulted from a third solution, were employed in the final multiplication.

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.
P	0.889	0.859	0.859	1.600

§ 13.—FINAL SOLUTION.

For the attainment of our ultimate results, nothing now remains but the reconstruction of the normal equations, by multiplying them severally by their weights as deduced in the last section, discarding those series which are clearly incapable of increasing the precision of the values sought, and summing the others thus multiplied. The solution of the resultant equations will afford the best values of the unknown quantities which we are entitled to expect.

The present section contains the multiplied equations for each series, together with their solution and the information thence deduced.

From the first series of *Mars*-observations the Athens group is excluded, and the remainder furnish equations as follows:

MARS I.

Normal Equations multiplied by their weights.

	Santiago equatorial.	Washington equatorial.	Cape equatorial.	Cape meridian.	Greenwich equatorial.	Greenwich meridian.	Cambridge equatorial.	Total.
[aa]	519.152	38.145	277.796	20.659	5.386	7.901	37.496	906.535
[ab]	106.163	— 37.527	— 204.128	— 13.302	— 1.411	1.540	— 37.192	— 185.857
[ac]	139.321	40.700	133.275	9.743	1.146	8.872	26.602	362.659
[ag]	680.233	— 14.735	393.420	29.099	— 4.413	— 4.801	— 23.708	1055.095
[bb]	348.402	101.728	333.149	24.355	2.866	22.184	74.005	906.689
[bc]	84.023	— 85.973	— 184.405	— 13.750	— 1.574	2.683	— 60.164	— 259.160
[bg]	83.915	15.973	— 300.547	— 19.730	1.576	0.294	25.628	— 192.891
[cc]	69.312	90.276	123.302	9.781	1.045	19.382	50.537	363.635
[cg]	170.108	— 16.362	189.914	13.825	— 1.168	— 4.855	— 19.836	331.626
[gg]	901.325	5.771	558.909	41.134	3.760	3.012	15.609	1529.520
[an]	347.375	133.875	907.036	58.820	— 0.267	— 4.859	109.598	1551.548
[bn]	— 976.444	— 250.454	— 997.000	— 76.349	— 4.437	— 46.173	— 169.512	— 2520.369
[cn]	— 120.892	202.305	561.471	42.127	1.339	— 21.858	133.551	798.043
[gn]	638.229	— 55.157	1312.395	86.050	— 0.459	— 0.438	— 75.479	1905.141
[nn]	4001.950	842.310	3794.850	330.010	14.070	130.770	505.850	9619.810

We hence obtain

$$
\begin{aligned}
x &= -1''.6688 \pm 0''.0938 \\
y &= +2''.8755 \pm 0''.0378 \\
z &= +1''.5885 \pm 0''.0805 \\
w &= -0''.0762 \pm 0''.0621
\end{aligned}
$$

and, consequently,

	Santiago equatorial.	Washington equatorial.	Cape equatorial.	Cape meridian.	Greenwich equatorial.	Greenwich meridian.	Cambridge equatorial.	Total.
	$''$	$''$	$''$	$''$	$''$	$''$	$''$	$''$
[nn]	1896.170	2074.590	2136.650	734.810	52.770	397.230	810.530	8102.750
P[nn.4]	357.465	133.642	213.958	62.259	26.678	28.947	82.845	905.794
[nn.4]	169.371	329.156	120.467	138.627	100.049	87.933	132.743	1078.346
ε	± 0.837	± 1.913	± 0.889	± 1.817	± 2.485	± 2.097	± 1.539	± 1.002
Weight	1.434	0.274	1.270	0.304	0.162	0.228	0.424	1.000
P^1	2.107	0.403	1.866	0.447	0.239	0.335	0.623	—

in which P^1 denotes the weight, expressed in terms of the unit used for P.

From the second series of *Mars*-observations the Kremsmünster group is excluded, and we have—

MARS II.

Normal Equations multiplied by their weights.

	Santiago equatorial.	Santiago meridian.	Santiago meridian, (supplementary.)	Washington equatorial.	Cape meridian.	Greenwich meridian.	Total.
[*aa*]	589.166	32.492	8.324	31.275	74.231	24.667	760.155
[*ab*]	— 16.638	3.509	— 1.125	— 0.159	— 10.680	20.313	— 4.780
[*ac*]	434.702	20.586	6.078	0.614	26.707	25.398	514.085
[*ag*]	659.449	37.156	9.486	— 13 202	89.064	— 14.537	767.416
[*bb*]	1086.732	51.464	15.195	1.523	66.751	63.488	1285.153
[*bc*]	— 27.694	6.238	0.036	— 0.109	— 15.722	38.056	0.805
[*bg*]	— 47.457	1.660	— 1.834	0.250	— 13.554	— 9.159	— 70.094
[*cc*]	540.717	23.511	8.001	0.020	19.537	50.173	641.959
[*cg*]	452.808	21.788	6.374	— 0.273	30.699	— 13.254	498.142
[*gg*]	744.327	42.846	10.909	5.596	107.148	8.717	919.603
[*an*]	377.138	0.725	3.322	43.451	47.088	— 57.350	414.374
[*bn*]	— 3665.374	— 202.282	— 49.348	— 0.985	— 251.960	— 212.386	— 4382.335
[*cn*]	— 81.886	— 22.977	— 7.582	0.935	44.113	— 148.976	— 216.373
[*gn*]	584.565	11.247	6.726	— 18.416	62.569	21.981	668.672
[*nn*]	14246.980	989.916	228.046	64.444	1020.984	837.259	17387.629

These give us—

$$x = -1''.6785 \pm 0''.1643$$
$$y = +3''.4050 \pm 0''.0445$$
$$z = +1''.6438 \pm 0''.0925$$
$$w = +0''.0427 \pm 0''.1334$$

	Santiago equatorial.	Santiago meridian.	Santiago meridian, (supplementary.)	Washington equatorial.	Cape meridian.	Greenwich meridian.	Total.
	"	"	"	"	"	"	"
[*nn*]	9256.240	2406.860	739.680	25.510	632.690	1221.950	14282.930
P[*nn*.4]	958.970	201.548	56.470	18.351	119.774	87.924	1443.037
[*nn*.4]	623.041	490.040	183.164	7.264	74.222	128.322	1506.053
ε	± 1.282	± 2.556	± 2.822	± 0.931	± 1.329	± 2.002	± 1.578
Weight.	1.515	0.381	0.313	2.874	1.407	0.621	1.000
p^1	1.602	0.403	0.331	3.039	1.491	0.657	—

For the first series of *Venus*-observations the multiplication gives us the annexed coefficients :

VENUS I.

Normal Equations multiplied by their weights.

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.	Altona meridian.	Total.
[aa]	529.033	35.587	25.525	5.347	2.000	597.492
[ab]	— 158.960	— 4.621	— 28.408	2.762	4.564	— 184.603
[ac]	812.414	45.554	41.721	10.195	4.174	914.058
[ag]	582.018	16.823	— 46.780	— 12.113	— 3.974	535.974
[bb]	2029.652	113.879	104.303	25.487	10.434	2283.755
[bc]	— 300.240	— 11.295	— 66.967	5.877	9.561	— 363.064
[bg]	— 110.027	8.988	46.658	— 5.097	— 9.058	— 68.536
[cc]	1684.765	91.303	85.887	28.681	8.777	1899.413
[cg]	772.891	17.644	— 70.521	— 18.773	— 8.273	692.968
[gg]	683.722	9.790	87.824	29.665	7.905	818.906
[an]	43.141	110.141	— 36.327	4.334	— 2.500	118.789
[bn]	—2890.280	—151.457	— 58.080	— 37.161	— 5.935	—3142.913
[cn]	69.261	164.880	— 38.475	— 0.076	— 5.637	189.953
[gn]	12.494	39.596	71.637	— 16.917	4.833	111.643
[nn]	5657.458	662.965	409.373	117.478	5.770	6853.044

The corresponding values are—

$$\mathbf{x} = +\ 0''.4007 \pm 0''.2407$$
$$\mathbf{y} = +\ 1''.4156 \pm 0''.0473$$
$$\mathbf{z} = +\ 0''.1157 \pm 0''.1041$$
$$\mathbf{w} = -\ 0''.3780 \pm 0''.1272$$

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.	Altona meridian.	Total.
	"	"	"	"	"	"
[nn]	2649.000	1304.060	829.180	373.470	5.770	5161.480
P[nn.4]	850.474	532.304	355.199	116.606	31.307	1885.890
[nn.4]	398.219	1047.047	719.451	370.697	31.307	2566.721
ε	± 1.278	± 3.983	± 3.884	± 5.340	—	± 2.215
Weight.	3.002	0.309	0.325	0.172	—	1.000
P^1	4.193	0.432	0.454	0.240	—	—

Lastly, the second *Venus*-series furnishes, after exclusion of the Cracow group and combination of the rest in the proportion of their weights, the following values for the coefficients, unknown quantities and residuals:

VENUS II.

Normal Equations multiplied by their weights.

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.	Total.
[*aa*]	63.363	39.529	11.652	27.204	141.748
[*ab*]	52.607	18.722	— 10.085	16.284	77.528
[*ac*]	84.054	39.481	20.241	26.881	170.657
[*ag*]	99.950	79.539	— 12.323	— 43.081	124.085
[*bb*]	210.131	98.696	50.605	67.189	426.621
[*bc*]	126.241	42.857	— 13.386	41.515	197.227
[*bg*]	74.198	33.001	8.424	— 21.241	94.382
[*cc*]	170.570	73.735	36.406	65.430	346.141
[*cg*]	118.166	66.775	— 21.440	— 30.691	132.810
[*gg*]	161.509	165.203	13.201	72.308	412.221
[*an*]	228.197	136.120	9.358	70.043	443.718
[*bn*]	596.912	283.762	79.013	164.362	1124.049
[*cn*]	399.553	147.665	25.934	114.813	687.965
[*gn*]	351.022	283.540	— 14.316	—103.861	516.285
[*nn*]	2189.278	1274.621	190 560	490.552	4145.011

$$\mathbf{x} = -\ 2''.4926 \pm 0''.3149$$
$$\mathbf{y} = -\ 2''.4760 \pm 0''.1234$$
$$\mathbf{z} = -\ 0''.7160 \pm 0''.2040$$
$$\mathbf{w} = -\ 0''.1661 \pm 0''.1246$$

	Santiago equatorial.	Santiago meridian.	Washington equatorial.	Greenwich meridian.	Total.
	″	″	″	″	″
[*nn*]	2463.501	1483.290	221.760	306.552	4475.103
P[*nn*.4]	342.527	216.460	48.743	54.839	662.569
[*nn*.4]	385.431	251.897	56.723	34.270	728.321
ε	± 2.393	± 2.449	± 2.436	± 1.624	± 2.146
Weight.	0.804	0.768	0.776	1.747	1.000
P^1	0.888	0.848	0.857	1.929	—

§ 14.—DIAMETERS.

The values of the semidiameters of *Mars* and *Venus* at the unit of distance, which have been assumed in the foregoing computations are as already stated in § 4.

Mars, $\varrho = 4.''6639$; (Oudemans, *Astr. Nachr.* XXXV, 351.)
Venus, $\varrho = 8.''6625$; (Wichmann, *Astr. Nachr.* XXXII, 74.)

Both these determinations are free from any error due to the thickness of the micrometer-threads, being derived from heliometer-observations.

That for *Mars* was derived from a careful discussion of the measurements of Bessel from 1830 to 1837, published in the XXIII. part of the Königsberg observations. The observations, having been made under a great variety of circumstances, and at greatly different distances, seemed well adapted for avoiding the influence of any constant of irradiation upon the result, and for detecting its amount. Prof. Oudemans found it impossible to bring the ellipsoidal form of the planet into the investigation, and the deduced value rests, therefore, upon the hypothesis of sphericity. Assuming a constant error in the measured diameter, and introducing this as an unknown quantity into the equations of condition, he found this error (which has been denoted by $\mathbf{u}$ in the present discussion) to be $-0''.0267$; and thence inferred both that no such influence of irradiation had affected the observations, and that no other essential constant error existed in them. The probable error of the semidiameter came out as less than one hundredth part of a second, or only one half as much as if the supposed irradiation had been ignored ; that of the deduced constant error was about one-third greater than its whole amount. The probable error of a single setting was $0.''2975$.

The adopted value for the semidiameter of *Venus* was deduced by Prof. Wichmann from his own measurements, which had been also made with the Königsberg Heliometer. The circumstances under which he observed were quite various, although the greater portion of the measurements were included within a period of two months. Some of the observations were made in broad daylight, some in the twilight, others still by night ; and the conditions were yet further varied by the employment of different magnifying powers, and sometimes of shade-glasses. Out of the eleven groups of comparisons the discordance of the extremes was but $0.''51$ for the entire diameter, and the resultant mean, derived from sixty-four settings, appears entitled to much weight. No decided influence of irradiation was detected.

In the *Astronomical Journal* III, 9, Prof. Peirce gives the results of a discussion of the semidiameters of *Mars* and *Venus* from the published observations with the Mural Circle of the Naval Observatory at Washington, in 1845 and 1846. His especial motive in the computation was to investigate the probability of the existence of any constant and spurious enlargement of the apparent disc, in consequence either of irradiation or of any other cause. He arrived at the curious inference that the constant quantity $\mathbf{t}$ was essentially the same for each of the two planets. His figures are as follows, $\Delta\varrho$ denoting the correction to the value in the Nautical Almanac.

For *Mars*, $\mathbf{t} = 0.''596 \pm 0.''167 \qquad \Delta\varrho = 0.''0375 \pm 0.''0086$
For *Venus*, $\mathbf{t} = 0.''554 \pm 0.''107 \qquad \Delta\varrho = 0.''1397 \pm 0.''0257$

Assuming the value of $\mathbf{t}$ to be identical for the two planets, and combining the results with regard to their probable errors, Professor Peirce obtained the final determinations:

$$\mathbf{t} = 0.''565 \pm 0.''121 \qquad \varrho = 5.''055 \pm 0.''101 \text{ for } \textit{Mars}$$
$$\varrho = 8.''546 \pm 0.''086 \text{ for } \textit{Venus}$$

The discordance between these results and those deduced from Königsberg observations cannot fail to attract attention.

I had hoped that the large number of observations now under discussion would throw much light upon the source of these discordances, and did not consider it permissible, under the circumstances, to omit terms containing the two unknown quantities $\mathbf{t}$ and $\mathbf{u}$ from the equations of condition. One of these, $\mathbf{t} = \mathbf{i}_1 + \mathbf{q}$, depends upon such influences as are peculiar to the observer and the instrument, comprising such portion of the irradiation as is constant, as also the personal error of the observer in setting, and any error in the assumed thickness of the threads. The other, $\mathbf{u} = \delta\varrho + i_0$, is simply the correction to the assumed semidiameter, and consists of the correction proper, together with such irradiation as may be practically inseparable from it when illuminated limbs are observed, or that which varies with the amount of light. These two terms are not strictly merged, the influence of one varying inversely with the distance from the earth, and that of the other being dependent on the brightness, and consequently on the radius-vector also. But in the entire absence of any probability of trustworthy results should these be separated, both were brought into one term, having a coefficient inversely proportional to the distance from the earth.

The earliest tentative solutions, in which these quantities were placed on the same footing with the others, suggested grave doubts as to the practicability of deducing satisfactory results even for $\mathbf{t}$ and $\mathbf{u}$. It has been seen that in the subsequent solutions these doubts were too well confirmed; so that it became necessary both to ignore one of the terms, by assuming one unknown quantity as inappreciable, and then to call the measured semidiameters to our aid for freeing the fundamental equations from the influence of the other one. For various reasons it appeared advisable to discard $\mathbf{u}$ rather than $\mathbf{t}$, especially, since the variety of instruments and observers seemed to offer more opportunities for the elimination of the latter than the comparatively small variation in the distance during the period comprised by any one of the four planet-series permits for the former.

The deduction of any satisfactory values of the semidiameters from the Fundamental Equations being entirely abandoned, our only remaining reliance must be upon what were called in § 11 "Additional Equations," *i.e.*, those derived from actual measurement of the diameters; these measurements having been in a few cases direct, and in the others affected by the motion of the planet and by changes of parallax and refraction. But here, also, as has been already stated, the attempt to separate the two unknown quantities was unavailing; and the only course is, here upon a small scale as in the whole investigation upon a larger one, to deduce from the materials before us such results as they are competent to furnish, and therewith to be for the present content.

The equations are these:

Equations from measurement of diameters.

Planet-series and Instrument.	[*dd.*]	[*de.*]	[*dn.*]	[*ee.*]	[*en.*]	[*nn.*]
Mars I.—Santiago equatorial . . .	211.460	324.364	— 469.397	503.332	— 717.614	1095.428
Washington equatorial . .	76.990	120.312	— 248.693	189.217	— 388.831	976.024
Cape of Good Hope equatorial	103.150	170.780	20.102	283.620	31.715	47.116
Cambridge equatorial . . .	21.780	35.167	— 15.780	56.844	— 25.840	20.020
Mars II.—Santiago equatorial . . .	313.620	427.593	— 310.360	588.809	— 428.790	351.765
Santiago meridian-circle . .	4.000	5.908	— 3.070	8.720	— 4.564	2.696
Washington equatorial . .	17.220	25.736	— 42.817	38.463	— 63.981	107.066
Venus I.—Santiago equatorial . . .	13.480	24.601	— 14.176	44.923	— 25.824	15.725
Santiago equatorial (direct) .	41.680	94.203	— 20.099	224.107	— 42.479	20.654
Santiago meridian-circle . .	35.000	92.619	18.125	260.040	47.560	18.513
Washington equatorial . .	39.910	95.671	— 45.889	233.684	— 105.478	87.586
Venus II.—Santiago equatorial . . .	64.700	149.230	— 48.898	355.388	— 102.911	110.211
Santiago equatorial (direct) .	25.960	71.843	— 25.463	202.954	— 71.887	30.287
Santiago meridian-circle . .	45.000	116.343	12.905	312.751	45.095	41.957
Washington equatorial . .	18.200	37.113	— 28.813	76.065	— 60.112	51.802

The solution of these equations gives the results exhibited, in the table below, chiefly as a matter of curiosity and interest.

It proves the attempt to separate the quantities **t** and **u** to be, at least in the present case, altogether futile. The two last columns give the resultant value of **t** upon the supposition **u** = 0, and that of **u** if **t** be ignored.

Solution of equations derived from measurement of diameters.

Series.	Instrument.	N°. of obs.	π	[*nn*]	[*nn* .2]	**t**	Mean error.	**u**	Mean error.	(**u** = 0) **t**	(**t** = 0) **u**
Mars I . .	Santiago equatorial	55	211	1095.428	52.465	+2.8580	±0.3211	—0.4162	±0.2082	+2.2198	+1.4257
	Washington equatorial . . .	21	77	976.024	172.666	+2.9694	±2.1655	+0.1650	±1.3817	+3.2302	+2.0549
	Cape equatorial	41	103	47.116	40.373	—3.1804	±1.1239	+1.8032	±0.6777	—0.1949	—0.1118
	Cambridge equatorial . . .	8	22	20.020	6.496	—8.5833	±3.6990	+5.8226	±2.3014	+0.7245	+0.4546
Mars II . .	Santiago equatorial	80	314	351.765	39.165	—0.3311	±0.2013	+0.9688	±0.1469	+0.9896	+0.7282
	Washington equatorial . . .	5	17	107.066	0.831	—28.8881	±15.5795	+20.9928	±10.2977	+2.4865	+1.6634
	Santiago meridian-circle . .	4	4	2.696	0.115	—9.5000	±5.5340	+7.5000	±3.9131	+0.7675	+0.5228
Mars I & II	Santiago equatorial	135	525	1447.188	231.380	—1.3017	±0.2454	+1.9459	±0.1702	+1.4850	+1.0497
	Washington equatorial . . .	26	94	1083.090	180.444	+1.9924	±1.9288	+0.7097	±1.2408	+3.0943	+1.9888
Venus I . .	Santiago equatorial	3	13	15.725	0.734	+4.2500	±2.8271	—1.8077	±1.5682	+1.0516	+0.5748
	Santiago equatorial (direct.) .	11	42	20.654	10.186	+1.0773	±0.3511	—0.2634	±0.1514	+0.4822	+0.1895
	Santiago equatorial (all) . .	14	55	36.379	12.766	+1.5252	±0.2984	—0.4197	±0.1351	+0.6214	+0.2539
	Washington equatorial . . .	14	40	87.586	30.106	+3.6469	±1.0345	—1.0419	±0.4276	+1.1498	+0.4514
	Santiago meridian-circle . .	35	35	18.513	9.116	—0.5890	±0.3705	+0.0270	±0.1360	—0.5179	—0.1829
Venus II .	Santiago equatorial	26	65	110.211	64.546	+2.7909	±0.7109	—0.8822	±0.3033	+0.7558	+0.2896
	Santiago equatorial (direct.) .	8	26	30.287	4.824	+0.0302	±0.6169	+0.3434	±0.2207	+0.9809	+0.3542
	Santiago equatorial (all) . .	34	91	140.498	77.292	+1.6473	±0.5280	—0.3391	±0.2128	+0.8202	+0.3131
	Washington equatorial . . .	6	18	51.802	1.404	—5.6087	±0.9704	+3.5247	±0.4744	+1.5831	+0.7903
	Santiago meridian-circle . .	45	45	41.957	26.752	+2.2487	±0.6012	—0.9809	±0.2281	—0.2868	—0.1442
Venus I & II	Santiago equatorial	48	146	176.877	93.040	+1.4144	±0.3230	—0.2873	±0.1356	+0.7450	+0.2938
	Washington equatorial . . .	20	58	139.388	39.240	+3.1280	±0.7672	—0.8067	±0.3324	+1.2855	+0.5346
	Santiago meridian-circle . .	80	80	60.470	43.443	+0.7357	±0.3845	—0.4301	±0.1437	—0.3879	—0.1618

The equations deduced from measurement with the Santiago instruments may be slightly improved by introducing the new-found values of **v**. The original equations of condition derived from direct measurements were of the form

$$0 = n + d\,\mathbf{t} + e\,\mathbf{u}$$

when n represents the excess of the computed above the measured semi-diameters,

$$n = \frac{\varrho_0}{\Delta} \pm \tfrac{1}{2}\,(\delta_2 - \delta_1)$$

The numerical value of the quantity $\frac{1}{2}\,(\delta_2 - \delta_1.)$ is to be increased (since the value of **v** is in both cases positive) by the amount

$$f\,\mathbf{v} = \mu\ \varDelta m = \mu\, r = \mu \cdot \frac{\varrho_0}{\Delta}$$

inasmuch as we may, without perceptible error, substitute for $\varDelta m$ the computed semi-diameter. The numerical correction having the same sign as the measured semi-diameter, it is clear that the correction to be applied to n is negative, so that the corrected value will be

$$n' = n - \frac{1}{\Delta}\,\mu\,\varrho = n - e\,.\,\mu\,\varrho$$

and we find

$$[\,n'n'\,] = [\,nn\,] - 2\,[\,en\,]\,.\,\mu\varrho + [\,ee\,]\,.\,(\mu\varrho)^2$$

For those equations which are derived from direct measurements, the case is not quite so simple. We have in these instances

$$n = \frac{\varrho_0}{\Delta} \pm \left\{ \tfrac{1}{2}\,(\delta_2 - \delta_1) - \tau\, D_t\,\delta + \tau\, D_t\, p \right\}$$

and as before $\varDelta m = \frac{1}{2}\,(\delta_2 - \delta_1)$. We cannot now so boldly substitute the computed semi-diameter in the place of this quantity ; but a glance at the actual value of the new terms

$$\mp\,(\tau\ D_t\,\delta - D_t\,p)$$

will assure us that their small average value and constant change of sign render more precise computation altogether needless.

The normal equations for semidiameter derived from Santiago observations are therefore to be modified by the introduction of n' instead of n; so that—

$$[dn'] = n' = [dn] - [de]\,\mu\varrho$$
$$[en'] = [en] - [ee]\,\mu\varrho$$
$$[n'n'] = [nn] - 2\,[en]\,\mu\varrho + [ee]\,(\mu\varrho)^2$$

The values of **v**, already obtained, were for the Santiago equatorial, $+0''.57$, and for the Santiago meridian-circle, $+\,0''.39$; whence,

			Equatorial.	Meridian-circle.
	ϱ_0	μ	$\mu\varrho$	$\mu\varrho$
Mars,	4″.64	0.0057	0″.0264	0″.0181
Venus,	8 .662	0.0039	0 .0494	0 .0338

The previous equations from Santiago thus become—

	[dd]	[de]	[dn]	[ee]	[en]	[nn]
Mars I. Equatorial	211.460	324.364	— 477.960	503.332	— 730.902	1133.669
II. "	313.620	427.593	— 321.648	588.809	— 444.335	374.810
I and II. "	525.080	751.957	— 799.608	1092.141	—1175.237	1508.479
II. Meridian-circle . . .	4.000	5.908	— 3.177	8.730	— 4.722	2.864
Venus I. Equatorial	13.480	24.601	— 15.391	44.923	— 28.043	18.386
I. " (direct) . .	41.680	94.203	— 24.753	224.107	— 53.550	25.398
I. " (all) . .	55.160	118.804	— 40.144	269.030	— 81.593	43.784
II. "	64.700	149.230	— 56.270	355.388	— 120.467	121.246
II. " (direct) . .	25.960	71.843	— 29.012	202.954	— 81.913	37.884
II. " (all) . . .	90.660	221.073	— 85.282	558.342	— 202.380	159.130
I and II. " (all) . . .	145.820	239.877	— 125.426	827.372	— 283.973	202.914
Venus I. Meridian-circle . . .	35.000	92.619	+ 14.994	260.040	+ 38.771	15.595
II. "	45.000	116.343	+ 8.973	312.751	+ 34.524	39.266
I and II. "	80.000	208.962	+ 23.967	572.791	+ 73.295	54.861

And their solution gives—

	N°. of obs.	π	[nn]	[nn.2]	t	Mean error.	u	Mean error.	u = 0 t	t = 0 u
Mars I. Equatorial . .	55	211	1133.669	52.465	+ 2.8580	± 0.3211	— 0.3899	± 0.2082	+ 2.2603	+ 1.4521
II. " . .	80	314	374.810	39.158	— 0.3314	± 0.2013	+ 0.9954	± 0.1469	+ 1.0256	+ 0.7546
I and II. " . .	135	525	1508.479	231.375	— 1.3018	± 0.2454	+ 1.9724	± 0.1702	+ 1.5228	+ 1.0761
II. Meridian-circle .	4	4	2.864	0.123	— 9.5000	± 5.5453	+ 7.5000	± 3.9211	+ 0.7942	+ 0.5409
Venus I. Equatorial . .	3	13	18.386	0.734	+ 4.2500	± 2.8271	— 1.7692	± 1.5682	+ 1.1418	+ 0.6242
I. " (direct)	11	42	25.398	10.186	+ 1.0773	± 0.3511	— 0.2140	± 0.1514	+ 0.5939	+ 0.2390
I. " (all) .	14	55	43.784	12.764	+ 1.5252	± 0.2984	— 0.3703	± 0.1351	+ 0.7278	+ 0.3033
II. " . .	26	65	121.246	64.546	+ 2.7909	± 0.7109	— 0.8328	± 0.3033	+ 0.8697	+ 0.3390
II. " (direct)	8	26	37.884	4.824	+ 0.0302	± 0.6169	+ 0.3930	± 0.2207	+ 1.1176	+ 0.4036
II. " (all) .	34	91	159.130	77.290	+ 1.6473	± 0.5280	— 0.2897	± 0.2128	+ 0.9407	+ 0.3625
I and II. " (all) .	48	146	202.914	93.040	+ 1.4144	± 0.3230	— 0.2379	± 0.1356	+ 0.8601	+ 0.3432
Venus I. Meridian-circle .	35	35	15.595	9.116	— 0.5890	± 0.3705	+ 0.0607	± 0.1360	— 0.4284	— 0.1491
II. " .	45	45	39.266	26.752	+ 2.2487	± 0.6012	— 0.9471	± 0.2281	— 0.1994	— 0.1104
I and II. " .	80	80	54.861	43.443	+ 0.7357	± 0.3845	— 0.3964	± 0.1437	— 0.2996	— 0.1280

§ 15.—RESULTS.

The fruit of all the preceding researches may be presented in narrow compass. It consists of new values for the semi-diameters of *Mars* and *Venus*, and of the final value for the solar parallax.

First, as regards the diameters:

Were it possible to separate the two unknown quantities **t** and **u**, so that it might be palpable what portion of the apparent correction to the semi-diameters should be attributed to terrestrial influences, the determination of the magnitudes of *Mars* and *Venus* would be attended with comparatively small difficulty, so copious are the observations from which the semi-diameters might be deduced. But this obstacle interferes at the very outset; and although the collection and consolidation of all the values of such quantities as may be supposed constant for any one instrument has been essayed in every form, the accordance of the results is in no degree commensurate with *a priori* theory.

The determination of **t** (which comprises, 1st, the effect of personal equation in pointing; 2nd, any error in the assumed thickness of the micrometer-threads; and 3rd, any spurious increase of diameter by irradiation depending upon the instrument or other local causes) is only needed, apart from its interest and usefulness for analogous future investigations, in order that the influence of this source of error may be eliminated from our measurement of the actual semi-diameters. This measurement depends, in fact, upon our unknown quantity **u**; which is the correction to the semi-diameter at the unit of distance, including, of course, any irradiation which, being proportional to the distance, may only be detected by means of occultations or transits across the solar disk.

Confining the computation to observations made at Santiago and Washington, we may obtain final values for **u** by the adoption of either one of two different principles. First, and most naturally, we may combine according to their weights the values of **u** deduced from actual solution of the normal equations; or, secondly, we may in like manner combine those values which correspond to the assumption $\mathbf{t} = o$, and which are given in the last columns of the tables of solution in § 14; the weights being, in both cases, proportional to πe^{-2}. I give the results of each method of combination.

First method.

Planet.	Instrument.	u.	p.
		″	
Mars	Santiago equatorial	+ 1.9724	18133
	Washington equatorial	+ 0.7097	61
	Both	+ 1.9681	
Venus	Santiago equatorial	— 0.2379	7941
	Santiago meridian-circle	— 0.3964	3875
	Washington equatorial	— 0.8067	525
	All	— 0.3118	

Second method.

Planet.	Instrument.	u.	p.
Mars	Santiago equatorial	″ +1.0761	1187
	Washington equatorial	+1.9888	48
	Both	+1.1116	
Venus	Santiago equatorial	+0.3432	226
	Santiago meridian-circle	−0.1280	144
	Washington equatorial	+0.5346	83
	All	+0.2287	

It is manifest, at the first glance, that the results of the first method are those which we must employ; and the remarkable discordance of the sign in the *Venus*-measures with the meridian-circle illustrates the importance of allowing for the influence of the quantity **t**, even despite the embarrassments which attend the endeavor.

We thus arrive at the definite values:

$$\textit{Semi-diameter of Mars} = 4''.6639 + 1''.9681 = 6''.63$$
$$\textit{Semi-diameter of Venus} = 8.6625 - 0.3118 = 8.35,$$

values which, although affected with a very large probable error, would appear to be more trustworthy than those heretofore employed.

Lastly, the resultant value of the solar parallax is to be deduced, thus attaining the prominent end of the national Astronomical Expedition, in the prosecution of which its earnest and devoted Superintendent has expended such unremitting effort and unceasing toil—rewarded by a mass of observations of high usefulness for the advancement of science, and most honorable to himself and his assistants—and among whose incidental results was the establishment and national adoption of the first permanent observatory in one of the great divisions of our globe.

The four resultant values of $\mathbf{w} = \delta\varpi$ (the correction to Encke's determination) are now presented, together with the subsidiary quantities. Their diversity is striking; but to me they seem to point unquestionably toward a decided diminution of the adopted value. The following table presents the case in a succinct form. The first column contains the deduced correction to be applied to the quantity, 8″.57116. The number **e** in the second column is the mean error as given by the ordinary formula $e = \frac{\varepsilon_0}{p}$; where $p = [gg\ .3]$, and $\varepsilon_0 = \sqrt{\frac{[nn\ .4]}{[aa] - 4}}$ is the mean error of a single observation whose weight is unity. It is evident that, since, in the primitive equations of condition, we had uniformly $aa = a = 1$, the sum $[aa]$ taken after the multiplication of each equation by its weight, as explained in § 10, is equal to the whole number of these standard or unitary observations employed. This quantity e is, therefore, a much larger number than what is commonly called the mean error, being undivided by the

square root of the number of observations. The next columns show, first, the number of actual northern and southern observations, upon which the determination rests, irrespective of the relative value of these observations and of the number of comparisons from which they are severally derived; and secondly, under the heading π, the number of observations having the weight unity to which these are respectively equivalent. Lastly, the table shows the values of ε_0, the mean error of a unitary observation, and the quantity $\frac{1}{e^2}$, or weight of the corresponding value of $\delta\varpi$:

	$\delta\varpi$	e	N°. of obs.		π		ε_0	$\frac{1}{e^2}$
			N.	S.	N.	S.		
							"	
Mars I .	— 0.0762	0.0621	111	151	236.2	448.4	1.002	259.2
Mars II .	+ 0.0427	0.1334	60	214	61.4	534.8	1.578	56.2
Venus I .	— 0.3780	0.1272	35	128	70.7	317.7	2.215	61.8
Venus II .	— 0.1661	0.1246	39	73	46.6	117.3	2.146	64.4

The first of these values, that derived from the observations of *Mars* during the first opposition, appears so far superior to the others in all the elements which can insure, and in all the indications which can manifest, precision, that I should feel far less hesitation in adopting it, to the exclusion of all the rest than in attempting to combine the values of the several series by any principle which I can devise. The determination necessarily depends, not upon individual observations, but upon what we may consider as couples of observations; and no amount of thorough and careful work in the southern hemisphere can suffice to furnish means for a trustworthy deduction of the parallax beyond the limit which is prescribed by the number and quality of the northern observations. Only for the first opposition of *Mars* does the material furnished by the northern hemisphere suffice for a respectable determination; and, with the sole exception of the Naval Observatory at Washington, no northern observatory has provided a single micrometric observation for any of the other series. The meridian observations, if they are to be compared for such delicate purposes, require corrections for error in latitude, or some form of personal equation;—corrections which, if omitted or wrongly applied, leave our resultant values affected by their full amount, but which we have, nevertheless, no means of determining except from inadequate data, and by processes not very much better than groping. For all these reasons, no less than for the great intrinsic superiority of the observations as indicated by the mean error of an observation whose weight is unity, this first value—

$$\delta\varpi = -0''.0762 \pm 0''.0621$$

seems to be of a different order of excellence from the rest, and not likely to be brought nearer to the truth by any combination with the others.

Nevertheless, should it be thought best to combine the several values, the principles already developed in § 10 will assign to the three other series relative weights so insignificant as to amount to a practical corroboration of the views just expressed. We may namely determine the relative worth of the several determinations, as expressed by the number of standard observations of the weight unity which would be requisite in order to attain the precision which belongs to each determination. For this purpose we will retain the hypothesis of § 10, $b = 5$; so that $P_n = \frac{6n}{n+5}$, P denoting the weight of a result deduced from n observations.

Let ν be the number of observations requisite for attaining the degree of accuracy possessed by a given determination. We have then—

$$P_\nu = \frac{6\nu}{\nu + 5}, \text{ and } P_\nu = \frac{1}{e^2}\,C$$

where C denotes a constant, to be experimentally determined.

Taking the first *Mars*-series as the standard, and putting $\nu = 111$, (the number of northern observations,) we find—

$$P_{111} = 5.741 = 259.2C; \quad C = 0.022.$$

With this value we determine ν_2 from the formula

$$\frac{6\nu_2}{\nu_2 + 5} = \frac{1}{e_2^2}\,0.022 = 56.194 \cdot 0.022,$$

whence, $\nu_2 = 1.30$

or the worth of the value **w** given by the second *Mars*-series is only 1.30 of just such standard observations as those of which 111 measure the worth of the value derived from *Mars* I.

In like manner we shall find the value of w derived from the first *Venus*-series to be worth 1.47, and that from the second series 1.55 standard observations of the weight unity.

The difference of methods would afford a ground for the introduction of still another element of relative weight, the two planets being manifestly adapted in very different degrees for enabling an investigation of this kind to be successfully prosecuted. Indeed, the difference in the geocentric distance of the planets during the four series of observations is such as to render it quite warrantable to bring this also into the scale.

If we determine the weights according to the ordinary method we shall have for the four series, respectively, 286, 34, 22 and 25, provided that we consider the number of actual northern observations as being that upon which the determinations rest. But if, more strictly, we consider this number as being that of the unitary standard observations whose weight is unity, we find the weights of the four series to be, respectively, 613, 35, 44 and 30.

These several principles of combination are illustrated in the annexed table, which gives the relative weights resulting from each. Calling the number of northern observations n', the number of southern ones n'', and retaining the former notation in other respects, we have in round numbers:

Relative Weights of the deduced values of the Solar Parallax.

Series.	$\frac{n'+n''}{e^2}$	$\frac{n'}{e^2}$	$\frac{\pi}{e^2}$	ν
Mars I .	679	286	613	111.0
Mars II .	154	34	35	1.3
Venus I .	101	22	44	1.5
Venus II .	72	25	30	1.5

How entirely disproportionate are the relative values of the several series, is sufficiently evident, even from the first column of the foregoing table, although this is the one which presents the heterogeneousness in the least unfavorable light.

If, in the estimated relative weights, we introduce a factor to represent the opportunities for accurate measurement of the parallax which are afforded by the respective series, exclusive of

those peculiarities of detail which have already found expression in the computation, the disproportion will be yet further increased. The distance of *Mars* at the second opposition was greater than at the first by nearly 15 per cent; the proximity of *Venus* to the sun was accompanied by serious disadvantages, and still other influences combined to render the first series upon *Mars* decidedly better adapted for attaining the desired end.

All these considerations concur to support the opinion already expressed, that the results of the first *Mars*-series should be regarded as the results of the expedition, and that the value

$$\delta\varpi = -0.''0762$$

should be accepted as the best which the observations will afford.

The combination of the three other series, independently of this first one, furnishes values indicating a much larger diminution, whatever method of combination may be employed. The four different principles for estimating the relative weight conduct to the four following values of $\delta\varpi$, as deduced from the second *Mars*-opposition, combined with the two conjunctions of *Venus*.

Weights.	$\delta\varpi$
$(n' + n'')\, e^{2}$	$-0.''1332$
$n'\, e^{-2}$	$-0.''1360$
$\pi\, e^{-2}$	$-0.''1844$
ν	$-0.''1769$

Adopting, then, as final the value given by the first *Mars*-series, we have

$$\varpi = 8.''5712 - 0.''0762 = 8.''4950\,;$$

according to which we may assume with advantage,

The sun's equatorial horizontal parallax $= 8.''5000$;

being less by $0.''07$ than the value commonly adopted, and corresponding to a distance of

24 266 *terrestrial semidiameters,* 96 160 000 *statute miles,* or 15 475 000 *myriameters.*

OPPOSITION OF MARS, 1849–50.

MICROMETRICAL OBSERVATIONS,

WITH

THE 8½ FEET EQUATORIAL,

AT

THE OBSERVATORY, SANTIAGO, CHILE,

BY THE U. S. NAVAL ASTRONOMICAL EXPEDITION.

DECEMBER 10, 1849.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	Rumker . . 1673	. .	41.5	54.0	7.7	20.5	4 50 54.33	+0.48½			28.104	67.4	59.4
2	Mars . . . N.P.	.	41.5	54.5	8.0	21.0	4 52 54.65	—0.49½	+2 0.32	—0.98			
3 a	Rumker . . 1673	. .	22.0	35.0	48.5	1.5	4 56 35.15	1.97			Ther. att. 68°.5		
4	Mars . . . S.F.	10.0	23.5	36.2	49.5	2.2	4 58 36.28	4.10	2 1.13	2.13	Bar. red. to 32° F.		
5 a	Rumker . . 1673	. .	57.7	10.5	23.4	36.5	5 2 10.43	1.69			27.996		
6	Mars . . . N.P.	43.5	56.5	9.1	23.0	35.7	5 4 9.56	2.57	1 59.13	0.88			
7 a	Rumker . . 1673	. .	55.8	8.0	22.0	34.5	5 7 8.40	2.57					
8	Mars . . . S.F.	41.5	54.7	7.7	21.3	34.0	5 9 7.84	—4.34	1 59.44	1.77			
9 a	Rumker . . 1673	. .	57.5	10.2	24.0	36.5	5 13 10.45	+1.84					
10	Mars . . . N.P.	34.0	46.7	9.8	13.4	25.7	5 15 9.92	1.07	1 59.47	0.77			
11 a	Rumker . . 1673	. .	29.0	41.7	55.0	7.7	5 18 41.75	1.14					
12	Mars . . . S.F.	14.0	27.5	40.7	54.5	7.2	5 20 40.78	0.40	1 59.03	1.54			
13 a	Rumker . . 1673	. .	29.5	42.5	56.0	8.5	5 25 42.53	2.15					
14	Mars . . . N.P.	13.2	26.7	39.7	53.2	6.0	5 27 39.76	1.65	1 57.24	0.50			
15 a	Rumker . . 1673	. .	10.2	23.0	36.2	49.0	5 29 23.00	+1.65					
16	Mars . . . S.F.	55.0	7.7	20.7	33.7	46.7	5 31 20.76	—0.03	1 57.76	1.68			
17 a	Rumker . . 1673	. .	59.5	12.5	25.5	38.2	5 33 12.33	+1.11					
18	Mars . . . N.P.	42.5	55.5	9.0	22.0	34.7	5 35 8.74	+0.49	1 56.41	0.62			
19 b	Rumker . . 1673	. .	17.7	31.2	44.5	57.0	5 22 31.00	—3.64					
20	Mars . . . N.P.	58.0	10.7	23.5	37.0	50.0	5 24 23.84	4.20	1 52.84	0.56			
21	Rumker . . 1673	51.5	. .	17.2	31.0	44.0	5 26 17.64	4.61					
22	Mars . . . S.F.	45.7	59.0	12.0	25.0	38.0	5 28 11.94	6.10	1 54.30	1.49			
23	Rumker . . 1673	. .	49.5	2.5	16.5	28.7	5 30 2.70	6.10					
24	Mars . . . N.P.	28.2	41.5	54.7	7.7	20.7	5 31 54.56	6.69	1 51.86	0.59			
25 c	Rumker . . 1673	29.2	42.7	56.0	9.2	21.7	5 33 55.76	7.07					
26	Mars . . . S.F.	22.5	35.7	49.0	2.5	15.3	5 35 49.00	8.61	1 53.24	1.54			
27	Rumker . . 1663	35.7	48.5	1.5	14.2	27.5	5 38 1.48	8.61					
28	Mars . . . N.P.	26.2	39.2	52.3	6.0	18.5	5 39 52.44	9.05	1 50.96	0.44			
29	Rumker . . 1673	39.7	53.0	6.0	19.5	32.2	5 42 6.08	9.41					
30 d	Mars . . . S.F.	33.2	46.5	59.7	12.7	26.0	5 43 59.62	. .	1 53.54				
31	Rumker . . 1673	. .	36.2	49.5	3.0	15.7	5 46 49.50	3.56					
32	Mars . . . S.F.	15.7	29.0	42.2	55.5	8.5	5 48 42.18	4.83	1 52.68	1.27			
33	Rumker . . 1673	5.7	19.2	32.0	45.0	58.0	5 50 31.98	4.27					
34	Mars . . . N.P.	. .	10.2	23.5	36.2	49.0	5 52 23.12	4.60	1 51.14	0.33			
35	Rumker . . 1673	0.2	13.5	26.7	39.7	52.7	5 54 26.56	4.89					
36	Mars . . . S.F.	51.5	5.2	18.5	31.7	44.7	5 56 18.32	6.42	1 51.76	1.53			
37 e	Rumker . . 1673	. .	17.0	30.0	43.0	55.7	6 11 29.82	3.96					
38	Mars . . . N.P.	. .	6.5	19.5	32.5	45.5	6 13 19.40	4.48	1 49.58	0.52			
39	Rumker . . 1673	. .	53.5	6.5	19.5	32.5	6 16 6.40	4.92					
40	Mars . . . S.F.	29.7	42.5	55.5	9.0	22.0	6 17 55.74	6.02	1 49.34	1.10			
41	Rumker . . 1673	13.5	26.5	39.7	52.7	5.5	6 19 39.58	5.64					
42	Mars . . . N.P.	0.5	13.5	26.7	40.0	53.0	6 21 26.74	5.74	1 47.16	0.10			
43	Rumker . . 1673	. .	45.2	58.3	12.0	25.0	6 22 58.52	4.72					
44	Mars . . . S.F.	21.5	35.0	48.0	1.3	14.0	6 24 47.96	5.49	1 49.44	0.77			
45	Rumker . . 1673	. .	37.2	50.0	3.7	16.2	6 27 50.17	5.46					
46	Mars . . . N.P.	13.0	25.5	38.7	52.5	5.4	6 29 39.02	—5.50	+1 48.85	—0.04			

DECEMBER 10, 1849—Continued.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Rumker . . 1673	15.2	28.7	42.0	55.2	8.0	6 31 41.82	—6.39			28.104	67.4	59.4
48	Mars . . . S.F.	4.7	18.0	31.2	44.5	57.5	6 33 31.18	7.48	+1 49.36	—1.09			
49	Rumker . . 1673	54.0	7.5	20.7	33.5	46.5	6 35 20.44	7.40			Ther. att. 68°.5		
50	Mars . . . N.P.	42.0	55.0	8.0	21.0	34.0	6 37 8.00	7.48	1 47.56	0.08	Bar. red. to 32° F. 27.996		
51	Rumker . . 1673	. .	37.5	50.5	3.7	16.5	6 38 50.45	8.07					
52	Mars . . . S.F.	13.2	26.5	39.5	53.0	6.0	6 40 39.64	9.19	1 49.19	1.12			
53	Rumker . . 1673	57.5	10.5	24.2	37.5	50.2	6 42 23.98	9.04					
54	Mars . . . N.P.	46.0	59.0	12.0	25.5	38.3	6 44 12.16	—9.04	+1 48.18	—0.00			

Remarks.

a Mars blazing and very unsteady during these observations. There being probably a mistake of 20*m.* in the time, they are not incorporated in obtaining the means.

b Observations generally better.

c Good measures.

d Neglected to read micrometer.

e Observations are tolerably good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Eight transits . . .	6 5 44.49	+1 51.164	—1.239 . . .	= 0 24.15
Mean N. P. . . .	Eight transits . . .	6 9 2.14	+1 49.792	—0.296	= 0 5.77

	h. m. s.		h. m. s.
Correction for chronometer at 6 6	+ 7.36	Santiago sid. time S. F.	6 5 51.85
Correction for chronometer at 6 9	+ 7.36	Santiago sid. time N. P.	6 9 9.50
		Interval	3 17.65

	″		″
Δ P. F. limbs in A. R. reduced to arc	20.58	Δ N. S. limbs micr. in rev.	0.943 = 18.38
Variation of A. R. in 3*m.* 18*s.*	— 3.52	Variation of declination in 3*m.* 18*s.* . .	— 0.30
Observed P. F. diameter	17.06	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	15.88

h. m.	″	h. m.	″
Δ ρ at 6 5	0.03	Δ ρ at 6 8	0.01

DECEMBER 11, 1849.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.P.	37.0	51.0	4.0	17.5	30.0	3 56 3.90	+9.47			28.068	70.3	58.5
2	Rumker . . 1680	45.5	58.5	11.5	25.2	37.7	3 56 11.68	±0.00	—7.78	+9.47			
3 *a*	Mars . . . S.F.	20.0	. .	46.5	59.5	12.5	3 58 46.27	+9.49			Ther. att 70°.3		
4	Rumker . . 1680	26.7	40.0	53.0	6.7	19.5	3 58 53.18	±0.00	6.91	9.49	Bar. red. to 32° F. 27.954		
5 *b*	Mars . . . N.P.	48.5	2.5	15.5	29.0	42.0	4 1 15.50	+8.16					
6	Rumker . . 1680	55.5	. .	22.5	36.0	49.0	4 1 22.47	±0.00	6.97	8.16			
7	Mars . . . S.P.	. .	21.5	34.5	48.0	1.0	4 5 34.65	+9.40					
8	Rumker . . 1680	. .	30.0	43.0	57.0	9.5	4 5 43.27	±0.00	8.62	9.40			
9	Mars . . . N.P.	43.0	. .	. .	22.5	35.5	4 8 9.30	+8.36					
10	Rumker . . 1680	51.5	5.0	18.7	31.5	44.5	4 8 18.24	±0.00	8.94	8.36			
11	Mars . . . S.P.	. .	. .	52.0	6.0	18.5	4 11 52.31	+9.34					
12	Rumker . . 1680	35.0	48.5	1.5	15.0	27.7	4 12 1.54	±0.00	—9.23	+9.34			

DECEMBER 11, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
13 *a*	Mars . . . N.F.	0.0	. .	26.5	39.5	. .	4 19 26.33	. .			28.068	70.3	58.5
14	Rumker . . 1680	. .	22.0	. .	48.0	. .	4 19 34.88	. .	—8.55	. .			
15 *a*	Mars . . S P.	37.7	. .	. .	. .	. .	4 28 4.13	. .			Ther. att. 70°.3		
16	Rumker . . 1680	. .	1.0	. .	. .	. .	4 28 14.16	. .	10.03	. .	Bar red. to 32° F.		
17	Mars . . . N.P.	33.5	. .	59.5	. .	25.5	4 29 59.59	+8.42			27.954		
18	Rumker . . 1680	. .	56.0	. .	23.0	. .	4 30 9.38	±0.00	9.79	+8.42			
19	Mars . . . S.F.	41.5	. .	7.5	. .	33.0	4 32 7.42	+9.37					
20	Rumker . . 1680	. .	4.0	. .	30.0	. .	4 32 16.88	±0.00	9.46	9.37			
21	Mars . . . N.P.	18.7	. .	45.0	58.0	. .	4 34 44.90	+8.30					
22	Rumker . . 1680	. .	42.5	. .	8.5	. .	4 34 55.38	±0.00	10.48	8.30			
23 *c*	Mars . . . S.F.	20.0	. .	46.0	. .	12.0	4 44 46.09	+9.30					
24	Rumker . . 1680	. .	43.0	. .	9.5	. .	4 44 56.13	±0.00	10.04	9.30			
25	Mars . . . N.P.	51.0	. .	18.0	. .	43.0	4 47 17.42	+8.10					
26	Rumker . . 1680	. .	15.5	. .	42.0	. .	4 47 28.63	±0.00	11.21	8.10			
27	Mars . . . S.F.	27.0	. .	53.2	. .	19.5	4 49 53.32	+8.30					
28	Rumker . . 1680	. .	51.0	. .	17.5	. .	4 50 4.13	±0.00	10.81	8.30			
29	Mars . . . N.P.	40.2	. .	7.0	. .	33.0	4 52 6.82	+8.04					
30	Rumker . . 1680	. .	5.5	. .	32.0	. .	4 52 18.63	±0.00	11.81	8.04			
31	Mars . . . S.F.	24.5	. .	50.5	. .	16.5	4 54 50.59	—9.12					
32	Rumker . . 1680	. .	48.7	. .	15.0	. .	4 55 1.73	±0.00	11.14	9.12			
33	Mars . . . N.P.	10.3	. .	35.6	. .	. .	4 57 36.15	±0.00					
34	Rumker . . 1680	. .	35.0	. .	1.5	. .	4 57 48.13	—7.99	11.98	7.99			
35 *d*	Mars . . . S.F.	34.0	. .	0.3	. .	25.5	5 0 0.02	±0.00					
36	Rumker . . 1680	. .	58.5	. .	24.5	. .	5 0 11.38	—9.16	11.36	9.16			
37	Mars . . . N.P.	45.5	. .	. .	. .	. .	5 4 11.93	+7.98					
38	Rumker . . 1680	. .	11.5	. .	38.5	. .	5 4 24.88	±0.00	12.95	7.98			
39	Mars . . . S.F.	6.5	. .	. .	. .	59.0	5 7 32.89	+9.06					
40	Rumker . . 1680	. .	. .	45.3	. .	. .	5 7 45.27	±0.00	12.38	9.06			
41	Mars . . . N.P.	56.7	. .	. .	. .	49.0	5 9 22.99	+7.96					
42	Rumker . . 1680	. .	. .	36.5	. .	. .	5 9 36.47	±0.00	13.48	7.96			
43	Mars . . . S.F.	36.0	. .	. .	. .	29.5	5 11 2.89	+8.99					
44	Rumker . . 1680	. .	. .	15.5	. .	. .	5 11 15.47	±0.00	12.58	8.99			
45 *d*	Mars . . . N.P.	5.0	. .	. .	. .	57.5	5 12 31.39	+7.94					
46	Rumker . . 1680	. .	. .	44.5	. .	. .	5 12 44.47	±0.00	13.08	7.94			
47 *d*	Mars . . . S.F.	58.2	. .	. .	. .	50.2	5 14 24.34	+9.08					
48	Rumker . . 1680	. .	. .	36.7	. .	. .	5 14 36.67	±0.00	12.33	9.08			
49	Mars . . . N.P.	32.0	. .	. .	. .	24.7	5 16 58.49	+7.94					
50	Rumker . . 1680	. .	. .	12.5	. .	. .	5 17 12.47	±0.00	13.98	7.94			
51	Mars . . . S.F.	25.7	. .	. .	. .	17.5	5 18 51.74	+8.97					
52	Rumker . . 1680	. .	. .	4.3	. .	. .	5 19 4.27	±0.00	12.53	8.97			
53	Mars . . . N.P.	13.7	. .	40.5	. .	6.5	5 52 40.32	+7.80					
54	Rumker . . 1680	. .	. .	57.0	. .	. .	5 52 56.97	±0.00	16.65	7.80			
55	Mars . . . S.F.	49.0	. .	16.0	. .	41.7	5 55 15.66	+8.73					
56	Rumker . . 1680	. .	. .	31.5	. .	. .	5 55 31.47	±0.00	15.81	8.73			
57	Mars . . . N.P.	21.0	. .	48.0	. .	14.2	5 57 47.82	+7.71					
58	Rumker . . 1680	. .	. .	5.0	. .	. .	5 58 4.97	±0.00	—17.15	+7.71			

DECEMBER 11, 1849—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
59	Mars . . .	S.F.	19.0	. .	45.3	. .	11.5	5 59 45.36	+8.87			28.068	70.3	58.5
60	Rumker . .	1680	. .	. .	1.3	. .	. .	6 0 1.27	±0.00	−15.91	+8.87			
61	Mars . . .	N.P.	59.5	. .	26.3	. .	52.0	6 2 26.02	+7.71			Ther. att. 70°.3 Bar. red. to 32° F. 27.954		
62	Rumker . .	1680	. .	. .	43.3	. .	. .	6 2 43.27	±0.00	17.25	7.71			
63	Mars . . .	S.F.	30.5	. .	57.2	. .	23.0	6 4 56.99	+8.76					
64	Rumker . .	1680	. .	. .	13.5	. .	. .	6 5 13.47	±0.00	16.48	8.76			
65	Mars . . .	N.P.	38.2	. .	5.0	. .	30.5	6 7 4.65	+7.69					
66	Rumker . .	1680	. .	. .	22.7	. .	. .	6 7 22.67	±0.00	18.02	7.69			
67	Mars . . .	S.F.	2.5	. .	29.5	.	56.0	6 9 29.42	+8.80					
68	Rumker . .	1680	. .	. .	46.0	. .	. .	6 9 45.97	±0.00	16.55	8.80			
69	Mars . . .	N.P.	35.0	. .	1.5	. .	27.0	6 12 1.25	+7.79					
70	Rumker . .	1680	. .	. .	19.2	. .	. .	6 12 19.17	±0.00	−17.92	+7.79			

Remarks.

Observations not very good, Mars being very unsteady. No. 1680, Rumker, was observed throughout the evening by mistake.

a Not incorporated into the means. *b* Recorded 47.5*s*. at wire A.

c Mars unsteady. *d* Good observation.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. P. . .	Three transits . . .	4 4 30.29	− 8.543	+9.403	=3 3.26
Mean N. P. . .	Two transits	4 4 42.40	7.955	8.260	2 40.99
Mean N. P. . .	Nine transits	4 56 18.85	12.084	8.074	2 37.36
Mean S. F. . .	Nine transits	4 59 16.59	11.403	9.039	2 56.17
Mean N. P. . .	Five transits	6 2 24.01	17.398	7.740	2 30.85
Mean S. F. . .	Four transits	6 2 21.86	−16.187	+8.790	=2 51.32

	h. m.	h. m. s.
Correction for chronometer at	4 4	+ 4.80
Santiago sid. time S. P.		4 4 35.09
Santiago sid. time N. P.		4 4 47.20
Interval		12.11

	″
Δ N. S. limbs micr. in rev. 1.143	= 22.27
Variation of declination in 12*s*. . . .	+ 0.00
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	20.07

	h. m.	h. m. s.
Correction for chronometer at	4 56	+ 4.70
Correction for chronometer at	4 59	+ 4.70
Santiago sid. time N. P.		4 56 23.55
Santiago sid. time S. F.		4 59 21.29
Interval		2 57.74

	h. m.	h. m. s.
Correction for chronometer at	6 2	+ 4.58
Santiago sid. time N. P.		6 2 28.59
Santiago sid. time S. F.		6 2 26.44
Interval		2.15

	″
Δ P. F. limbs in A. R. reduced to arc . . .	10.21
Variation of A. R. in 2*m*. 58*s*.	+ 3.21
Observed P. F. diameter	13.42

	″
Δ N. S. limbs micr. in rev. 0.965	= 18.81
Variation of declination in 2*m*. 58*s*. . .	+ 0 25
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	16.86

	″
Δ P. F. limbs in A. R. reduced to arc . . .	18.16
Variation of A. R. in 2*s*.	+ 0.00
Observed P. F. diameter	18.16

	″
Δ N. S. limbs micr. in rev. 1.050	= 20.47
Variation of declination in 2*s*.	+ 0.00
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	18.27

h. m.	″
Δ ρ at 4 5	0.24
Δ ρ at 4 5	0.21
Δ ρ at 4 56	0.18

h. m.	″
Δ ρ at 4 59	0.20
Δ ρ at 6 2	0.16
Δ ρ at 6 2	0.19

DECEMBER 12, 1849.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	43.0	56.2	9.0	22.5	35.2	3 38 9.18	+2.39			28.046	72.2	56.6
2	Rumker . . 1680	. .	47.0	0.0	13.5	26.5	3 40 0.15	4.55	—1 50.97	—2.16			
3	Mars . . . S.F.	27.7	41.0	54.0	7.5	20.0	3 41 54.04	0.94			Ther. att. 71°.0 Bar. red. to 32° F. 27.930		
4	Rumker . . 1680	. .	30.7	43.5	57.2	10.0	3 43 43.75	4.23	1 49.71	3.29			
5	Mars . . . N.P.	11.0	24.0	37.0	50.2	3.0	3 45 37.04	1.82					
6	Rumker . . 1680	2.0	14.7	28.0	42.0	54.5	3 47 28 24	4.20	1 51.20	2.38			
7	Mars . . . S.F.	48.0	1.7	14.5	27.5	40.2	3 49 14.38	0.53					
8	Rumker . . 1680	38.2	51.5	4.7	18.0	30.7	3 51 4.62	4.03	1 50.24	3.50			
9	Mars . . . N.P.	54.7	8.0	21.0	34.5	47.5	3 53 21.14	1.44					
10	Rumker . . 1680	. .	1.0	13.7	27.5	39.7	3 55 13.87	3.69	1 52.73	2.25			
11 *a*	Mars . . . S.P.	. .	55.5	8.5	22.0	34.5	4 3 8.52	2.71					
12 *b*	Rumker . . 1680	. .	47.5	0.5	14.5	27.5	4 5 0.90	+4.25	1 52.38	1.54			
13 *a*	Mars . . . S.F.	43.0	57.2	10.2	24.0	36.8	4 8 10.24	—1.33					
14 *b*	Rumker . . 1680	. .	56.0	9.5	23.2	36.3	4 10 9.65	4.04	1 59.41	2.71			
15 *a*	Mars . . . N.P.	33.3	46.5	59.7	13.3	25.7	4 15 59.70	2.07					
16	Rumker . . 1680	. .	39.5	52.5	5.7	20.0	4 17 52.82	4.56	1 53.12	2.49			
17 *a*	Mars . . . S.F.	32.0	45.5	58.5	12.0	24.5	4 19 58.50	0.40					
18	Rumker . . 1680	. .	37.5	50.5	4.0	17.5	4 21 50.77	3.17	1 52.27	2.77			
19 *a*	Mars . . . N.P.	17.5	30.5	43.5	57.0	9.8	4 24 43.66	1.28					
20	Rumker . . 1680	. .	24.5	37.5	51.5	4.5	4 26 37.90	3.05	1 54.24	1.77			
21 *a*	Mars . . . S.F.	9.0	22.0	35.0	48.0	1.5	4 28 35.10	0.00					
22	Rumker . . 1680	. .	15.0	28.2	42.0	54.5	4 30 28.32	2.87	1 53.22	2.87			
3 *a*	Mars . . . N.P.	42.5	55.5	8.5	21.5	34.5	4 33 8.50	0.83					
24	Rumker . . 1680	. .	50.5	3.5	16.8	. .	4 35 3.51	2.42	1 55.01	1.59			
25 *a*	Mars . . . S.F.	43.0	56.0	10.0	24.0	37.4	4 37 10.08	0.08					
26 *c*	Rumker . . 1680	. .	50.5	4.0	17.5	30.5	4 39 4.02	2.24	1 53.94	3.32			
27 *d*	Mars . . . N.P.	26.5	40.5	53.0	6.5	. .	4 41 53.29	0.20					
28	Rumker . . 1680	. .	. .	. .	. .	. .	. . . . .	. .	. . .	. .			
29	Mars . . . N.P.	19.5	32.5	45.5	59.0	19.8	4 53 45.26	2.86					
30	Rumker . . 1680	. .	29.2	42.0	55.7	8.5	4 55 42.25	4.81	1 56.99	1.95			
31	Mars . . . S.F.	57.7	11.0	23.7	37.5	50.0	4 57 23.98	1.49					
32	Rumker . . 1680	. .	6.5	19.2	32.7	45.5	4 59 19.37	4.45	—1 55.39	—2.96			
33	Mars . . . N.P.	55.0	8.0	20.7	34.2	47.2	5 1 21.02	—2.27					
34	Rumker . . 1680	. .	. .	. .	. .	. .	. . . . .	. .	. . .	. .			

Remarks.

a Observations by Lieutenant MacRae.
b Omitted in the results.
c Not a good observation.
d Unable to perceive star.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Three transits . . .	3 45 42.45	—1 51.633	—2.263	=0 44.10
Mean S. F. . .	Two transits . . .	3 45 34.21	1 49.975	3.395	1 6.17
Mean N. P. . .	Four transits . . .	4 31 54.28	1 54.840	1.950	0 38 00
Mean S. F. . .	Four transits . . .	4 35 46.91	—1 53.705	—2.980	=0 58.08

	h. m.	s.
Correction for chonometer at	3 46	+2.03
Correction for chronometer at	4 32	+1.94
Correction for chronometer at	4 36	+1.93

DECEMBER 12, 1849—Continued.

Results—Continued.

	h. m. s.
Santiago sid. time for N. P.	3 45 44.48
Santiago sid. time for S. F.	3 45 36.24
Interval	8.24

	h. m. s.
Santiago sid. time for N. P.	4 31 56.22
Santiago sid. time for S. F.	4 35 48.84
Interval	3 52.62

	″
Δ P. F. limbs in A. R. reduced to arc . . .	24.87
Variation of A. R. in 8s.	— 0.14
Observed P. F. diameter	24.73

	″
Δ N. S. limbs micr. in rev.	1.132 = 22.06
Variation of declination in 8s.	0.00
Corr. for diam. of micr. wire	— 2.20
Observed N. S. diameter	.86

	″
Δ P. F. limbs in A. R. reduced to arc . . .	17.02
Variation of A. R. in 3m. 52s.	+ 4.20
Observed P. F. diameter	21.22

	″
Δ N. S. limbs micr. in rev.	1.030 = 20.07
Variation of declination in 3m. 52s . .	+ 0.31
Corr. for diam. of micr. wire	— 2.20
Observed N. S. diameter	18.18

h. m.	″
Δ ρ at 3 46	0.06
Δ ρ at 4 33	0.04

h. m.	″
Δ ρ at 3 46	0.09
Δ ρ at 4 37	0.07

DECEMBER 13, 1849.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	47.0	0.5	13.3	26.7	. .	4 8 13.42	+3.29			28.050	70.0	57.2
2	Rumker . . 1680	25.0	38.3	52.0	5.0	18.0	4 11 51.66	±0.00	—3 38.24	+3.29			
3 a	Mars . . . S.F.	0.5	14.0	27.2	40.5	53.5	4 14 27.14	+3.30			Ther. att. 71°.0 Bar. red. to 32° F. 27.934		
4	Rumker . . 1680	38.0	51.2	4.5	17.5	30.5	4 18 4.34	0.92	3 37.20	2.38			
5	Mars . . . N.P.	43.5	57.0	10.0	23.5	36.0	4 20 10.00	4.83					
6	Rumker . . 1680	22.5	35.5	49.0	2.5	14.7	4 23 48.84	1.39	3 38.84	3.44			
7 a	Mars . . . S.F.	12.2	25.5	38.3	52.0	4.7	4 25 38.54	3.40					
8	Rumker . . 1680	50.3	3.3	16.7	30.0	42.5	4 29 16.56	0.97	3 38.02	2.43			
9	Mars . . . N.P.	34.0	47.0	0.0	13.5	26.5	4 31 0.20	3.86					
10	Rumker . . 1680	13.5	26.5	39.7	53.2	16.0	4 34 39.78	0.30	3 39.58	3.56			
11	Mars . . . S F.	0.7	14.0	27.0	40.5	53.0	4 36 27.04	3.76					
12	Rumker . . 1680	40.0	53.5	6.5	20.0	32.7	4 40 6 54	1.56	3 39.50	2.20			
13	Mars . . . N.P.	34.5	48.0	1.0	14.5	27.2	4 42 1.04	+3.37					
14	Rumker . . 1680	15.0	28.2	41.5	55.0	7.5	4 45 41.44	—0.16	3 40.40	3.53			
15	Mars . . . S.F.	47.7	1.0	14.0	27.5	40.5	4 48 14.14	+4.25					
16	Rumker . . 1680	27.5	40.3	53.7	7.2	20.0	4 51 53.74	1.68	3 39.60	2.57			
17	Mars . . . N.P.	33.0	46.5	59.5	12.9	25.5	4 53 59.44	5.06					
18	Rumker . . 1680	14.5	27.7	41.0	54.0	7.2	4 57 40.88	1.45	3 41.44	3.61			
19	Mars . . . S.F.	52.0	5.0	18.3	31.5	44.5	4 59 18.26	3.52					
20	Rumker . . 1680	32.5	45.5	59.0	12.3	25.0	5 2 58.86	1.01	3 40.60	2.51			
21	Mars . . . N.P.	12.3	25.5	38.5	52.0	4.7	5 4 38.60	4.05					
22	Rumker . . 1680	54.5	7.7	21.0	34.0	47.0	5 8 20.90	0.45	3 42.30	3.60			
23	Mars . . . S.F.	36.0	49.5	2.5	16.0	28.7	5 10 2.54	4.31					
24	Rumker . . 1680	17.7	30.7	44.0	57.3	10.3	5 13 44.00	1.70	3 41.46	2.61			
25	Mars . . . N.P.	7.5	20.5	33.7	47.0	0.0	5 15 33.74	4.79					
26	Rumker . . 1680	50.5	3.7	17.0	30.5	43.3	5 19 17.00	1.12	3 43.26	3.67			
27	Mars . . . S.F.	39.7	53.0	6.3	19.5	32.3	5 21 6.16	3.25					
28	Rumker . . 1680	22.0	35.2	48.2	2.0	14.7	5 24 48.42	+0.64	—3 42.26	+2.61			

DECEMBER 13, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
29	Mars . . . N.P.	12.2	25.5	38.5	52.0	5.0	5 26 38.64	+5.58			28.050	70.0	57.2
30	Rumker . . 1680	56.2	9.5	22.7	36.0	49.0	5 30 22.68	1.90	—3 44.04	+3.68			
31	Mars . . . S.F.	2.5	15.5	29.0	42.3	55.0	5 33 28.86	8.99			Ther. att. 71°.0		
32	Rumker . . 1680	45.7	59.0	12.0	25.7	38.3	5 37 12.14	6.28	3 43.28	2.71	Bar. red. to 32° F.		
33	Mars . . . N P.	25.5	39.0	52.0	5.5	18.0	5 40 52.00	8.85			27.934		
34	Rumker . . 1680	11.0	24.2	37.5	50.7	3.5	5 44 37.38	5.02	3 45.38	3.83			
35	Mars . . . S.F.	28.0	41.0	54.3	8.0	20.5	5 47 54.36	7.49					
36	Rumker . . 1680	12.5	25.7	38.7	52.2	5.0	5 51 38.82	4.65	3 44.46	2.84			
37	Mars . . . N.P.	52.5	6.0	18.7	31.7	44.5	5 58 18.68	9.04					
38	Rumker . . 1680	38.2	51.5	5.0	18.5	31.2	6 2 4.88	9.24	3 46.20	3.80			
39	Mars . . . S.F.	11.5	25.0	38.0	51.0	4.0	6 4 37.90	7.65					
40	Rumker . . 1680	57.0	10.5	23.5	37.0	49.7	6 8 23.54	4.88	3 45.64	2.77			
41	Mars . . . N.P.	35.5	48.5	1.7	15.2	28.2	6 11 1.82	9.07					
42	Rumker . . 1680	23.2	36.3	49.7	3.0	15.5	6 14 49.54	5.28	3 47.72	3.79			
43	Mars . . . S.F.	3.0	16.0	29.3	42.5	55.2	6 17 29.20	8.12					
44	Rumker . . 1680	49.5	2.7	15.7	29.2	42.0	6 21 15 82	5.25	3 46.62	2.87			
45	Mars . . . N.P.	15.5	29.0	42.0	55.5	8.2	6 23 42.04	9.28					
46	Rumker . . 1680	4.0	17.3	30.5	44.0	56.7	6 27 30.50	5.33	3 48.46	3.95			
47	Mars . . . S.F.	18.0	31.5	44.2	58.0	10.5	6 30 44.44	7.91					
48	Rumker . . 1680	5.7	19.0	32.7	46.0	58.7	6 34 32.42	5.09	3 47.98	2.82			
49 *b*	Mars . . . N.P.	21.5	34.3	47.2	0.0	13.0	6 36 47.20	8.34					
50	Rumker . . 1680	9.2	23.0	36.0	49.0	2.0	6 40 35.84	4.32	3 48.64	4.02			
51 *b*	Mars . . . S.F.	40.0	52.0	4.5	17.5	30.3	6 42 4.86	7.20					
52	Rumker . . 1680	24.5	. .	50.5	4.0	17.5	6 45 50.84	4.29	3 45.98	2.91			
53 *b*	Mars . . . N.P.	30.5	44.0	57.0	10.5	23.0	6 47 57.00	7.70					
54	Rumker . . 1680	20.8	34.0	47.0	0.5	13 5	6 51 47.16	3.65	3 50.16	4.05			
55 *b*	Mars . . . S.F.	27.5	41.2	54.2	7.5	20.2	6 53 54.12	6.19					
56	Rumker . . 1680	17.0	30.5	43.5	57.0	9.5	6 57 43.50	3.17	3 49.38	3.02			
57 *b*	Mars . . . N.P.	54.0	7.2	20.5	33.5	46.5	7 0 20.34	6.61					
58	Rumker . . 1680	45.0	58.5	11.5	25.0	37.5	7 4 11.50	2.58	3 51.16	4.03			
59 *b*	Mars . . . S.F.	8.2	21.5	34.5	47.5	0.5	7 6 34.44	4.89					
60	Rumker . . 1680	58.0	11.0	24.5	38.0	50.5	7 10 24.40	1.78	3 49.96	3.11			
61 *b*	Mars . . . N.P.	35.8	48.5	1.8	15.2	28.2	7 13 1.90	10.48					
62	Rumker . . 1680	28.0	40.5	54.5	7.0	20.5	7 16 54.10	6.35	3 52.20	4.13			
63 *b*	Mars . . . S.F.	36.0	49.0	2.2	15.5	28.5	7 19 2.24	8.90					
64	Rumker . . 1680	27.2	40.5	53.5	7.3	20.0	7 22 53.70	5.85	3 51.46	3.15			
65 *b*	Mars . . . N.P.	2.5	15.5	29.0	42.0	55.5	7 25 28.90	9.29					
66	Rumker . . 1680	55.5	8.8	21.8	35.2	48.2	7 29 21.90	+5.16	—3 53.00	+4.13			

Remarks.

All observations made by me to-night are good. J. M. G.

a Excellent. *b* Observed by Mr. MacRae.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Seventeen transits .	5 44 41.47	—3 45.353	+3.771	= 1 13.50
Mean S. F. . .	Sixteen transits . .	5 44 26.51	—3 43.962	+2.719	= 0 52.99

DECEMBER 13, 1849—Continued.

Results—Continued.

	h. m. s.			h. m. s.
Correction for chronometer at 5 44	— 1.01		Santiago sid. time N. P.	5 44 40.46
Correction for chronometer at 5 44	— 1.01		Santiago sid. time S. F.	5 44 25.50
			Interval	14.96
	″			″
Δ P. F. limbs in A. R. reduced to arc	20.86		Δ N. S. limbs micr. in rev.	1.052 = 20.50
Variation of A. R. in 15s.	— 0.27		Variation of declination in 15s.	— 0.02
Observed P. F. diameter	20.59		Corr. for diam. of micr. wires	— 2.20
			Observed N. S. diameter	18.28
h. m.	″		h. m.	″
Δ ρ at 5 47	0.07		Δ ρ at 5 46	0.05

DECEMBER 14, 1849.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel	405	22.2	35.5	48.5	2.0	14.8	4 14 48.60	+13.01			28.180	70.0	54.9
2	Mars	N.P.	11.7	25.0	38.2	51.5	4.0	4 17 38.08	3.74	+2 49.48	—9.27			
3	Bessel	405	23.7	37.0	50.2	3.7	16.5	4 19 50.22	13.48			Ther. att. 70°.5		
4	Mars	S.F.	14.5	27.5	41.0	54.0	7.0	4 22 40.80	3.14	2 50.58	10.34	Bar. red. to 32° F. 28.066		
5 a	Bessel	405	12.0	25.0	38.0	51.0	4.5	4 24 38.10	13.93					
6	Mars	N.P.	1.0	14.2	27.3	41.0	53.5	4 27 27.40	4 69	2 49.30	9.24			
7	Bessel	405	48.5	1.7	14.7	28.5	41.0	4 29 14.88	14.35					
8	Mars	S.F.	38.5	52.0	5.0	18.5	31.2	4 32 5.04	4.12	2 50.16	10.23			
9	Bessel	405	33.5	47.0	0.5	14.0	26.7	4 34 0.34	14.90					
10	Mars	N.P.	22.5	35.5	48.7	2.3	15.0	4 36 48.80	5.57	2 48.46	9.33			
11	Bessel	405	18.7	32.2	45.3	58.5	11.5	4 38 45.24	15.26					
12	Mars	S.F.	8.2	21.7	35.0	48.2	1.0	4 41 34.82	5.01	2 49.58	10.25			
13	Bessel	405	7.0	20.5	33.7	47.0	0.0	4 43 33.64	10.94					
14	Mars	N.P.	54.5	8.0	21.2	34.5	47.5	4 46 21.14	1.74	2 47.50	9.20			
15	Bessel	405	1.0	14.5	28.0	41.2	54.0	4 48 27.74	11.37					
16	Mars	S.F.	50.0	3.3	16.5	29.7	42.5	4 51 16.40	1.15	2 48.66	10.22			
17	Bessel	405	57.0	10.5	23.5	37.0	49.5	4 53 23.50	11.89					
18	Mars	N.P.	44.0	57.0	10.3	23.5	36.5	4 56 10.26	2.64	2 46.76	9.25			
19	Bessel	405	29.5	43.0	56.0	9.5	22.2	4 57 56.04	12.22					
20	Mars	S.F.	17.5	30.7	43.7	57.2	10.2	5 0 43.86	2.10	2 47.82	10.12			
21	Bessel	405	15.3	28.7	41.7	55.5	8.0	5 2 41.84	12.67					
22	Mars	N.P.	1.5	14.5	28.0	41.0	54.0	5 5 27.80	3.53	2 45.96	9.14			
23	Bessel	405	57.5	11.0	24.0	37.5	50.2	5 7 24.04	12.05					
24	Mars	S.F.	45.0	58.2	11.5	24.7	37.3	5 10 11.34	1.96	2 47.30	10.09			
25	Bessel	405	9.3	23.0	36.0	49.3	2.0	5 12 35.92	12.49					
26	Mars	N.P.	54.7	8.0	21.0	34.3	47.0	5 15 21.00	3.44	2 45.08	9.05			
27	Bessel	405	37.7	51.5	4.7	18.2	31.0	5 17 4.62	10.99					
28	Mars	S.F.	24.7	38.0	51.0	4.5	17.2	5 19 51.08	0.88	2 46.46	10.11			
29	Bessel	405	31.5	45.0	58.0	11.5	24.3	5 21 58.06	11.41					
30	Mars	N.P.	16.0	29.5	42.7	56.0	8.7	5 24 42.58	2.34	2 44.52	9.07			
31	Bessel	405	24.0	37.5	50.7	4.2	17.0	5 26 50.68	11.77					
32	Mars	S.F.	9.7	23.2	36.0	49.7	2.2	5 29 36.16	+1.69	+2 45.48	—10.08			

DECEMBER 14, 1849—Continued.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
33	Bessel . . .	405	16.0	29.5	42.5	56.0	8.7	5 31 42.54	+12.34			28.180	70.0	54.9
34	Mars . . .	N.P.	0.0	13.2	26.2	39.5	52.5	5 34 26.28	3.25	+2 43.74	−9.09			
35	Bessel . . .	405	43.0	56.3	9.2	23.0	35.7	5 36 9.44	12.59			Ther. att. 70.°5		
36	Mars . . .	S.F.	27.5	41.0	54.5	7.7	20.3	5 38 54.20	2.57	2 44.76	10.02	Bar. red. to 32° F. 28.066		
37[b]	Bessel . . .	405	18.0	31.0	44.0	57.5	10.2	5 43 44.14	11.54					
38	Mars . . .	N.P.	0.5	13.2	26.6	40.0	53.0	5 46 26.66	2.67	2 42.52	8.87			
39	Bessel . . .	405	21.5	34.5	47.5	1.5	14.5	5 50 47.90	12.30					
40	Mars . . .	S.F.	4.5	18.0	31.5	44.8	57.5	5 53 31.26	2.33	2 43.36	9.97			
41	Bessel . . .	405	50.5	4.5	17.2	30.5	43.3	5 56 17.20	12.48					
42	Mars . . .	N.P.	32.2	45.5	58.5	12.0	24.5	5 58 58.54	3.99	2 41.34	8.49			
43	Bessel . . .	405	3.0	16.0	28.8	42.5	55.2	6 1 29.10	13.27					
44	Mars . . .	S.F.	45.2	58.5	11.5	25.2	37.7	6 4 11.62	3.43	2 42.52	9.84			
45	Bessel . . .	405	29.0	42.5	55.5	9.0	21.5	6 6 55.50	13.84					
46	Mars . . .	N.P.	9.5	23.5	36.5	49.5	2.5	6 9 36.30	5.10	2 40.89	8.74			
47	Bessel . . .	405	42.5	56.0	9.5	22.5	35.5	6 13 9.20	10.67					
48	Mars . . .	S.F.	24.5	38.0	51.5	4.5	17.0	6 15 51.10	0.77	2 41.90	9.90			
49	Bessel . . .	405	9.5	23.0	. .	49.5	2.2	6 17 36.06	11.31					
50	Mars . . .	N.P.	49.5	3.3	16.0	29.5	42.5	6 19 16.06	2.48	2 40.00	8.83			
51	Bessel . . .	405	31.5	44.5	57.5	11.0	23.7	6 22 57.64	11.70					
52	Mars . . .	S.F.	. .	25.5	38.5	52.0	4.5	6 25 38.51	2.09	2 40.87	9.61			
53	Bessel . . .	405	55.5	9.0	22.5	35.5	48.5	6 28 22.20	12.43					
54	Mars . . .	N.P.	35.0	48.2	1.0	14.5	27.5	6 31 01.24	+3.63	+2 39.04	−8.80			

Remarks.

The observations of to-night are not as good as those of yesterday, there being more unsteadiness in the atmosphere, and a less perfect definition of all objects.

J. M. G.

a Recorded 52.0s. at wire D.

b The remaining measures by Mr. MacRae.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Fourteen transits . .	5 22 7.29	+2 44.593	— 9.026 . . .	=2 55.92
Mean S. F. . . .	Thirteen transits . .	5 22 0.47	+2 46.111	—10.060 . . .	=3 16.07

	h. m.	s.
Correction for chronometer at	5 22 . . .	—3.77
Correction for chronometer at	5 22 . . .	—3.77

	h. m. s.
Santiago sid. time N. P.	5 22 3.52
Santiago sid. time S. F.	5 21 56.70
Interval	6.82

	″
Δ P. F. limbs in A. R. reduced to arc . . .	22.77
Variation of A. R. in 7s.	— 0.12
Observed P. F. diameter	22.65

	″
Δ N. S. limbs micr. in rev.	1.034 = 20.15
Variation of declination in 7s. . . .	—0.01
Corr. for diam. of micr. wires . . .	—2.20
Observed N. S. diameter	17.94

h. m.	″
Δ ρ at 5 21	0.20

h. m.	″
Δ ρ 5 21	0.21

DECEMBER 15, 1849.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 405	20.5	34.0	47.5	1.2	13.5	3 33 47.34	+8.92			28.150	70.0	58.5
2	Mars . . . N.P.	. .	44.0	57.0	10.5	23.5	3 34 57.14	4.10	+1 9.80	—4.82			
3	Bessel . . . 405	38.5	53.0	6.3	20.0	32.5	3 38 6.06	9.42			Ther. att. 70°.5		
4	Mars . . . S.F.	48.5	2.3	15.3	28.5	41.0	3 39 15.12	3.50	1 9.06	5.92	Bar. red. to 32° F.		
5	Bessel . . . 405	50.3	3.5	16.7	30.2	43.0	3 41 16.74	9.48			28.036		
6	Mars . . . N.P.	58.0	11.0	24.5	38.0	50.5	3 42 24.40	4.70	1 7.66	4.78			
7	Bessel . . . 405	13.2	26.0	39.5	53.5	6.0	3 44 39.64	9.62					
8	Mars . . . S.F.	21.5	34.7	48.0	1.2	13.7	3 45 47.82	3.68	1 8.18	5.94			
9	Bessel . . . 405	17.3	31.0	44.5	58.0	10.5	3 47 44.26	9.72					
10	Mars . . . N.P.	24.9	37.7	51.0	4.3	16.7	3 48 50.92	4.95	1 6.66	4.77			
11	Bessel . . . 405	12.5	26.7	39.7	53.2	6.0	3 50 39.62	9.88					
12	Mars . . . S.F.	21.7	36.0	49.0	2.7	15.2	3 51 48.92	3.95	1 9.30	5.93			
13	Bessel . . . 405	54.5	7.7	21.0	34.5	47.2	3 54 20.98	9.86					
14 *a*	Mars . . . N.P.	0.2	16.3	29.0	42.5	55.0	3 55 28.60	5.14	1 7.62	4.72			
15	Bessel . . . 405	42.0	55.2	8.2	21.7	34.5	3 58 8.32	10.02					
16	Mars . . . S.F.	48.5	2.0	15.3	28.5	41.0	3 59 15.06	4.27	1 6.74	5.75			
17	Bessel . . . 405	25.2	38.5	51.7	50.0	17.5	4 1 51.58	10.05					
18	Mars . . . N.P.	30.5	43.7	56.5	10.0	22.5	4 2 56.64	5.33	1 5.06	4.72			
19	Bessel . . . 405	18.0	31.3	44.7	58.0	11.0	4 4 44.60	10.23					
20	Mars . . . S.F.	24.2	37.5	50.5	4.0	17.0	4 5 50.64	4.53	1 6.04	5.70			
21	Bessel . . . 405	6.0	19.2	32.0	45.2	58.5	4 9 32.18	10.30					
22	Mars . . . N.P.	10.5	23.5	36.7	50.0	3.0	4 8 36.74	5.59	1 4.56	4.71			
23	Bessel . . . 405	45.2	58.7	11.5	25.5	38.0	4 10 11.78	10.34					
24 *b*	Mars . . . S.F.	51.0	4.7	17.7	31.3	43.7	4 11 17.68	4.62	1 5.90	5.72			
25	Bessel . . . 405	28.7	42.0	55.0	8.5	21.2	4 12 55.08	10.49					
26	Mars . . . S.F.	34.7	47.7	0.5	14.0	26.7	4 14 0.72	4.76	1 5.64	5.73			
27	Bessel . . . 405	12.0	25.3	38.5	52.0	4.5	4 15 38.46	10.53					
28	Mars . . . N.P.	16.0	29.5	42.3	55.7	8.5	4 16 42.40	5.90	1 3.94	4.63			
29	Bessel . . . 405	56.2	9.3	22.7	36.0	49.0	4 18 22.64	10.66					
30	Mars . . . S.F.	1.5	14.0	27.7	41.2	54.0	4 19 27.68	4.98	1 5.04	5.68			
31	Bessel . . . 405	23.5	36.5	49.7	2.7	15.5	4 21 49.58	10.65					
32	Mars . . . N.P.	26.5	40.0	53.0	6.5	19.5	4 22 53.04	6.06	1 3.56	4.55			
33	Bessel . . . 405	18.7	32.0	45.2	58.7	11.5	4 24 45.22	10.73					
34	Mars . . . S.F.	23.5	37.0	50.0	3.5	16.2	4 25 50.04	5.10	1 4.82	5.63			
35	Bessel . . . 405	4.2	17.5	30.7	44.2	57.2	4 27 30.76	10.88					
36 *c*	Mars . . . N.P.	7.2	21.0	33.7	47.0	0.0	4 28 33.78	6.21	1 3.02	4.67			
37	Bessel . . . 405	44.5	57.7	11.0	24.2	37.0	5 9 10.88	6.75					
38 *d*	Mars . . . N.P.	44.0	57.5	10.5	24.0	37.0	5 10 10.60	2.30	59.72	4.45			
39	Bessel . . . 405	18.0	31.0	44.0	57.3	10.0	5 11 44.06	6.58					
40	Mars . . . S.F.	18.5	31.7	44.7	58.2	11.0	5 12 44.82	1.06	1 0.76	5.46			
41	Bessel . . . 405	56.0	9.5	22.2	35.7	48.5	5 14 22.38	6.60					
42	Mars . . . N.P.	56.7	9.2	22.2	35.7	48.0	5 15 22.36	2.20	59.98	4.40			
43	Bessel . . . 405	38.3	51.7	5.0	18.3	31.0	5 17 4.86	6.66					
44	Mars . . . S.F.	39.0	52.5	5.5	18.7	31.5	5 18 5.44	1.23	1 0.58	5.43			
45	Bessel . . . 405	21.0	34.0	47.0	0.5	13.3	5 19 47.16	6.83					
46	Mars . . . N.P.	19.7	33.2	46.2	59.5	12.3	5 20 46.18	+2.36	+ 59.02	—4.47			

DECEMBER 15, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 405	16.0	29.3	42.5	55.7	9.0	5 22 42.50	+6.87			28.150	70.0	58.5
48	Mars . . . S.F.	16.0	29.5	42.7	56.0	8.7	5 23 42.58	1.38	+1 0.08	−5.49			
49	Bessel . . . 405	50.7	4.0	16.7	30.5	43.0	5 25 16.98	6.86			Ther. att. 70°.5		
50	Mars . . . N.P.	49.0	2.5	15.7	29.0	41.7	5 26 15.58	2.43	58.60	4.43	Bar. red. to 32° F. 28.036		
51	Bessel . . . 405	21.0	34.0	47.5	0.7	13.5	5 27 47.34	6.94					
52	Mars . . . S.F.	21.0	34.0	47.5	0.5	13.0	5 28 47.14	1.50	59.40	5.44			
53	Bessel . . . 405	3.3	16.5	29.7	43.2	56.0	5 30 29.74	7.04					
54	Mars . . . N.P.	1.5	14.5	27.7	41.0	54.0	5 31 27.74	2.53	58.00	4.51			
55	Bessel . . . 405	48.0	1.2	14.0	27.5	40.2	5 33 14.18	7.07					
56	Mars . . . S.F.	47.0	0.5	14.0	27.3	39.7	5 34 13.70	1.60	59.52	5.47			
57	Bessel . . . 405	22.0	35.5	48.5	1.7	14.2	5 35 48.38	7.11					
58	Mars . . . N.P.	20.0	33.5	46.5	0.0	12.7	5 36 46.54	2.75	58.16	4.36			
59	Bessel . . . 405	57.0	10.2	23.3	36.7	49.3	5 38 23.30	7.18					
60	Mars . . . S.F.	56.0	9.0	22.2	35.7	48.5	5 39 22.28	1.78	58.98	5.40			
61	Bessel . . . 405	48.3	2.7	14.5	27.7	40.5	5 41 14.74	7.29					
62	Mars . . . S.F.	46.7	0.0	13.3	26.5	39.2	5 42 13.14	1.87	58.40	5.42			
63	Bessel . . . 405	19.5	33.0	46.2	59.5	12.5	5 43 46.14	7.29					
64	Mars . . . N.P.	17.0	30.0	43.0	56.5	9.5	5 44 33.20	2.96	57.06	4.33			
65	Bessel . . . 405	4.0	17.0	30.2	43.7	56.0	5 48 30.18	7.74					
66	Mars . . . N.P.	0.5	13.2	26.5	40.0	52.7	5 49 26.58	3.30	56.40	4.44			
67	Bessel . . . 405	2.5	15.7	29.0	42.5	55.3	5 51 29.00	7.68					
68	Mars . . . S.F.	0.5	14.0	27.0	40.5	53.0	5 52 27.00	2.30	58.00	5.38			
69	Bessel . . . 405	38.2	51.2	4.5	18.0	30.5	5 54 4.48	7.73					
70	Mars . . . N.P.	34.2	47.7	1.0	14.2	27.0	5 55 0.82	3.35	56.34	4.38			
71	Bessel . . . 405	6.7	19.5	33.0	46.3	59.0	5 56 32.90	7.80					
72	Mars . . . S.F.	4.0	17.0	30.3	43.7	56.5	5 57 30.30	2.33	57.40	5.47			
73	Bessel . . . 405	29.0	42.5	55.5	8.5	22.0	6 1 55.50	7.90					
74 e	Mars . . . N.P.	25.0	38.5	51.8	5.5	18.2	6 2 51.80	3.54	56.30	4.36			
75	Bessel . . 405	44.0	57.0	10.0	23.5	36.0	6 5 10.10	7.53					
76	Mars . . . S.F.	40.5	53.5	5.5	19.0	31.5	6 6 6.00	2.11	55.90	5.42			
77	Bessel . . . 405	31.5	44.5	57.8	11.0	23.5	6 7 57.66	7.34					
78	Mars . . . N.P.	25.5	39.5	53.0	6.5	19.2	6 8 52.74	3.29	55.08	4.05			
79	Bessel . . 405	22.0	35.0	48.5	2.0	15.0	6 11 48.50	7.50					
80	Mars . . . S.F.	18.5	32.0	45.0	58.5	11.5	6 12 45.10	2.30	56.60	5.20			
81	Bessel . . . 405	38.5	52.2	5.0	18.5	31.0	6 15 5.04	7.59					
82	Mars . . . N.P.	33.0	46.5	59.5	13.0	26.0	6 15 59.60	3.45	54.56	4.14			
83	Bessel . . . 405	4.3	17.2	30.0	43.5	56.0	6 18 30.20	7.50					
84	Mars . . . S.F.	59.5	13.3	26.5	39.3	52.5	6 19 26.22	2.36	56.02	5.14			
85	Bessel . . . 405	0.5	13.8	26.7	40.5	. .	6 21 26.92	7.68					
86	Mars . . . N.P.	. .	8.0	21.2	34.5	47.0	6 22 21.06	3.49	54.14	4.19			
87	Bessel . . . 405	48.2	1.5	14.8	28.8	41.0	6 24 14.86	7.86					
88	Mars . . . S.F.	43.5	57.0	10.0	23.5	36.5	6 25 10.10	2.64	55.24	5.22			
89	Bessel . . . 405	5.0	19.0	32.0	45.7	58.0	6 27 31.94	7.33					
90	Mars . . . N.P.	59.0	12.2	25.7	39.0	52.0	6 28 25.58	3.54	53.64	3.79			
91	Bessel . . . 405	39.5	53.5	6.5	19.5	32.3	6 31 6.26	7.92					
92	Mars . . S.F	35.0	48.5	1.5	15.5	27.8	6 32 1.66	+2.80	+ 55.40	−5.12			

DECEMBER 15, 1849—Continued.

Remarks.

Observations prior to 5*h*. 8*m*. are by no means satisfactory; the image of Mars being tremulous as though floating in a basin of agitated mercury, and badly defined.

a There was probably a slip of the telescope between wires A and B, occasioned by rapid turning of the micrometer screw.

b Micrometer reading recorded +5.62.

c Tolerably good observation.

d Observations tolerably good during the remainder of the series made by Mr. J. M. G.

e Observed by Mr. MacRae.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Eight transits . . .	4 3 14.38	+1 5.532	—4.706	=1 31.72
Mean S. F. . .	Nine transits . . .	4 3 37.07	1 6.747	5.778	1 52.61
Mean N. P. . .	Fourteen transits . .	5 47 44.31	56.934	4.286	1 23.53
Mean S. F. . .	Fourteen transits . .	5 50 19.67	+ 58.020	—5.362	=1 44.50

h. m.	s.	h. m.	s.
Correction for chronometer at 4 03	—5.48	Correction for chronometer at 5 48	—5.61
Correction for chronometer at 4 03	—5.48	Correction for chronometer at 5 50	—5.62
	h. m. s.		h. m. s.
Santiago sid. time N. P.	4 3 8.90	Santiago sid. time N. P.	5 47 38.70
Santiago sid. time S. F.	4 3 31.59	Santiago sid. time S. F.	5 50 14.05
Interval	22.69	Interval	2 35.35

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	18.22	Δ N. S. limbs mic. in rev.	1.072=20.89
Variation of A. R. in 23*s*.	+ 0.42	Variation of declination in 23*s*. . . .	+ 0.02
Observed P. F. diameter	18.64	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	18.71

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	16.29	Δ N. S. limbs mic. in rev.	1.076=20.97
Variation of A. R. in 2*m*. 35*s*.	+ 2.85	Variation of declination in 2*m*. 35*s*. . .	+ 0.14
Observed P. F. diameter	19.14	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	18.91

h. m.	″	h. m.	″
Δ ρ at 4 03	0.12	Δ ρ at 5 47	0.09
Δ ρ at 4 03	0.14	Δ ρ at 5 50	0.11

DECEMBER 16, 1849.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . .	N.P.	. .	12.5	25.5	39.0	. .	2 52 25.58	+4.10			28.116	74.1	59.4
2	Bessel . . .	405	. .	47.5	0.7	14.2	. .	2 53 0.71	5.00	—35.13	—0.90			
3	Mars . . .	S.F.	. .	56.2	9.5	23.0	. .	2 54 9.48	3.11			Ther. att. 74°.0		
4	Bessel . . .	405	. .	30.0	43.5	57.0	. .	2 54 43.41	5.06	33.93	1.95	Bar. red. to 32° F. 27.991		
5	Mars . . .	N.P.	. .	28.0	41.3	54.7	. .	2 55 41.24	4.31					
6	Bessel . . .	405	. .	4.0	16.7	30.2	. .	2 56 16.88	5.16	35.64	0.85			
7	Mars . . .	S.F.	. .	17.0	29.5	43.5	. .	2 57 29.91	3.48					
8	Bessel . . .	405	. .	52.5	5.7	19.3	. .	2 58 5.74	5.23	35.83	1.75			
9	Mars . . .	N.P.	. .	15.5	29.0	42.0	. .	3 0 28.74	4.38					
10	Bessel . . .	405	. .	51.7	4.5	18.5	. .	3 1 4.81	5.22	36.08	0.84			
11	Mars . . .	S.F.	. .	48.5	1.7	15.0	. .	3 2 1.64	3.43					
12	Bessel . . .	405	. .	23.2	36.3	50.0	.	3 2 36.41	5.25	34.78	1.82			
13	Mars . . .	N.P.	. .	27.7	40.7	54.0	. .	3 3 40.71	4.29					
14	Bessel . . .	405	. .	4.0	17.0	30.5	. .	3 4 17.08	5.08	36.37	0.79			
15	Mars . . .	S.F.	. .	7.7	21.0	34.5	. .	3 5 20.98	3.44					
16	Bessel . . .	405	. .	42.5	56.0	9.3	. .	3 5 55.84	+5.26	—34.86	—1.72			

DECEMBER 16, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α	Δ δ		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
17	Mars . . . N.P.	. .	10.0	23.2	37.0	. .	3 7 23.31	+4.60			28.116	74.1	59.4
18	Bessel . . . 405	. .	46.5	59.5	13.0	. .	3 7 59.58	5.33	—36.27	—0.73			
19	Mars . . . S.F.	. .	3.0	16.0	29.5	. .	3 9 16.08	3.63			Ther. att. 74°.0 Bar. red. to 32° F. 27.991		
20	Bessel . . . 405	. .	38.0	51.5	5.0	. .	3 9 51.41	5.48	35.33	1.85			
21	Mars . . . N.P.	. .	31.5	44.5	58.0	. .	3 10 44.56	4.79					
22	Bessel . . . 405	. .	8.5	21.5	35.0	. .	3 11 21.58	5.58	37.02	0.79			
23	Mars . . . S.F.	. .	21.7	34.7	48.3	. .	3 12 34.81	3.79					
24	Bessel . . . 405	. .	57.0	10.5	23.7	. .	3 13 10.31	5.63	35.50	1.84			
25	Mars . . . N.P.	. .	5.3	18.3	31.7	. .	3 14 18.34	4.90					
26	Bessel . . . 405	. .	42.2	55.0	8.7	. .	3 14 55.21	5.71	36.87	0.81			
27 *a*	Mars . . . S.F.	. .	59.0	12.2	25.5	. .	3 16 12.14	4.02					
28	Bessel . . . 405	. .	35.0	48.0	1.5	. .	3 16 48.08	5.92	35.94	1.90			
29	Mars . . . N.P.	. .	42.2	55.3	9.0	. .	3 17 55.21	5.07					
30	Bessel . . . 405	. .	19.5	32.5	46.0	. .	3 18 32.58	5.92	37.37	0.85			
31	Mars . . . S.F.	. .	54.3	7.3	20.7	. .	3 20 7.34	4.25					
32	Bessel . . . 405	. .	30.5	43.5	57.0	. .	3 20 43.58	6.01	36.24	1.76			
33	Mars . . . N.P.	. .	53.5	6.5	20.0	. .	3 22 6.58	5.43					
34	Bessel . . . 405	. .	31.0	44.3	57.7	. .	3 22 44.24	6.16	37.66	0.73			
35	Mars . . . S.F.	. .	48.2	1.5	14.7	. .	3 24 1.38	4.51					
36	Bessel . . . 405	. .	24.7	37.7	51.2	. .	3 24 37.78	6.39	36.40	1.88			
37	Mars . . . N.P.	. .	31.0	44.0	57.8	. .	3 25 44.18	5.59					
38	Bessel . . . 405	. .	9.0	22.0	35.7	. .	3 26 22.14	6.35	37.96	0.76			
39	Mars . . . S.F.	. .	3.5	16.5	30.0	. .	3 27 16.58	4.65					
40	Bessel . . . 405	. .	40.3	53.7	7.0	. .	3 27 53.58	6.39	37.00	1.74			
41	Mars . . . N.P.	. .	44.5	57.5	11.0	. .	3 28 57.58	5.53					
42	Bessel . . . 405	. .	22.3	35.7	49.2	. .	3 29 35.64	6.32	38.06	0.79			
43	Mars . . . S.F.	. .	0.5	13.7	27.2	. .	3 31 13.71	4.78					
44	Bessel . . . 405	. .	38.0	50.5	4.5	. .	3 31 50.91	6.38	37.20	1.60			
45	Mars . . . N.P.	. .	49.0	1.5	15.2	. .	3 33 1.81	5.89					
46	Bessel . . . 405	. .	27.0	40.5	54.2	. .	3 33 40.46	6.66	38.67	0.77			
47	Mars . . . S.F.	. .	35.5	48.7	2.0	. .	3 34 48.64	4.97					
48	Bessel . . . 405	.	13.0	26.0	39.5	. .	3 35 26.08	6.68	37.44	1.77			
49	Mars . . . N.P.	. .	17.0	30.0	43.5	. .	3 36 30.08	5.95					
50	Bessel . . . 405	. .	56.0	9.0	22.3	. .	3 37 9.01	6.72	38.93	0.77			
51	Mars . . . S.F.	. .	10.5	23.5	37.0	. .	3 38 23.58	5.08					
52	Bessel . . . 405	. .	48.2	1.0	15.0	. .	3 39 1.31	6.91	37.73	1.83			
53 *b*	Mars . . . N.P.	. .	25.0	37.5	51.5	. .	3 41 37.91	6.32					
54	Bessel . . . 405	. .	. .	17.5	31.2	44.2	3 42 17.76	6.82	39.85	0.50			
55	Mars . . . S.F.	. .	40.2	53.5	6.8	. .	3 44 53.41	5.12					
56	Bessel . . . 405	. .	18.2	31.5	. . .	. .	3 45 31.92	6.83	38.51	1.71			
57 *c*	Mars . . . N.P.	. .	33.5	47.5	. .	. .	3 47 47.07	6.35					
58	Bessel . . . 405	. .	14.5	29.0	. .	. .	3 48 28.32	6.91	41.25	0.56			
59	Mars . . . N.P.	. .	36.0	49.0	3.5	. .	3 50 49.41	6.40					
60	Bessel . . . 405	. .	16.5	29.2	42.5	. .	3 51 29.31	7.00	39.90	0.60			
61	Mars . . . S.F.	. .	17.2	30.5	44.0	. .	3 52 30.48	5.49					
62	Bessel . . 405	. .	55.8	10.2	24.2	. .	3 53 9.98	+7.06	—39.50	—1.57			

DECEMBER 16, 1849—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
63	Mars . . .	N.P.	. .	10.0	22.8	36.5	. .	3 54 23.10	+6.66			28.116	74.1	59.4
64	Bessel . . .	405	. .	50.0	3.0	16.5	. .	3 55 3.08	7.13	—39.98	—0.47			
65	Mars . . .	S.F.	. .	47.5	0.5	14.5	. .	3 56 0.74	5.61			Ther. att. 74°.0		
66	Bessel . . .	405	. .	28.3	40.7	54.0	. .	3 56 40.91	7.15	40.19	1.54	Bar. red. to 32° F. 27.991		
67 c	Mars . . .	N.P.	. .	16.8	29.5	43.2	. .	3 57 29.74	.79					
68	Bessel . . .	405	. .	0.5	13.5	26.5	. .	3 58 13.41	7.31	43.67	0.52			
69	Mars . . .	S.F.	. .	9.5	23.0	36.5	. .	3 59 22.91	5.80					
70	Bessel . . .	405	. .	49.8	5.2	19.5	. .	4 0 4.74	7.34	41.83	1.54			
71	Mars . . .	N.P.	. .	44.5	57.5	11.0	. .	4 0 57.58	6.89					
72	Bessel . . .	405	. .	25.2	38.0	51.8	. .	4 1 38.24	7.43	40.66	0.54			
73	Mars . . .	S.F.	. .	32.5	45.5	59.2	. .	4 2 45.64	6.03					
74	Bessel . . .	405	. .	12.8	25.2	39.0	. .	4 3 25 58	7.38	39.94	1.35			
75	Mars . . .	N.P.	. .	2.5	15.5	29.5	. .	4 4 15.74	7.10					
76	Bessel . . .	405	. .	43.5	57.5	10.5	. .	4 4 57.08	7.60	41.34	0.50			
77	Mars . . .	S.F.	. .	43.0	56.0	9.2	. .	4 5 55.98	6.09					
78	Bessel . . .	405	. .	23.0	35.5	49.5	. .	4 6 35.91	7.64	39.93	1.55			
79	Mars . . .	N.P.	. .	30.5	43.5	56.7	. .	4 7 43.48	7.21					
80	Bessel . . .	405	. .	11.5	24.2	37.5	. .	4 8 24.31	7.79	40.83	0.58			
81	Mars . . .	S.F.	. .	15.2	28.5	42.0	. .	4 9 28.48	6.20					
82	Bessel . . .	405	. .	55.5	8.0	21.5	. .	4 10 8.24	7.68	39.76	1.48			
83	Mars . . .	N.P.	. .	55.8	8.5	22.0	. .	4 11 8.67	7.31					
84	Bessel . . .	405	. .	36.5	49.5	3.5	. .	4 11 49.74	7.86	41.07	0.55			
85	Mars . . .	S.F.	. .	6.5	19.5	33.5	. .	4 13 19.74	6.44					
86	Bessel . . .	405	. .	46.5	0.0	13.5	. .	4 13 59.91	7.89	40.17	1.45			
87	Mars . . .	N.P.	. .	38.0	51.2	4.5	. .	4 14 51.19	7.46					
88	Bessel . . .	405	. .	19.5	32.5	46.2	. .	4 15 32.64	8.01	41.45	0.55			
89	Mars . . .	S.F.	. .	21.5	34.5	48.0	. .	4 16 34.58	6.57					
90	Bessel . . .	405	. .	2.2	15.0	28.2	. .	4 17 15.04	8.05	40.46	1.48			
91	Mars . . .	N.P.	. .	29.2	43.0	56.5	. .	4 18 42.81	7.70					
92	Bessel . . .	405	. .	11.5	24.5	38.2	. .	4 19 24.64	8.19	41.83	0.49			
93	Mars . . .	S.F.	. .	58.0	11.2	24.5	. .	4 21 11.14	6.67					
94	Bessel . . .	405	. .	38.5	51.8	5.5	. .	4 21 51.84	8.36	40.70	1.69			
95 d	Mars . . .	N.P.	. .	40.1	53.5	7.0	. .	4 22 53.44	7.83					
96	Bessel . . .	405	. .	22.5	35.5	49.2	. .	4 23 35.64	8.30	42.20	0.47			
97	Mars . . .	S.F.	. .	26.3	39.5	53.5	. .	4 24 39.68	6.82					
98	Bessel . . .	405	. .	7.5	20.7	34.7	. .	4 25 20.88	8.27	41.20	1.45			
99	Mars . . .	N.P.	. .	27.5	40.5	55.0	. .	4 26 40.91	7.94					
100	Bessel . . .	405	. .	10.0	23.0	36.2	. .	4 27 22.98	8.24	42.07	0.30			
101	Mars . . .	S.F.	. .	12.5	25.5	39.0	. .	4 28 25.58	7.02					
102	Bessel . . .	405	. .	54.0	6.8	20.5	. .	4 29 6.91	8.45	41.33	1.43			
103 e	Mars . . .	N.P.	. .	57.2	10.2	23.5	. .	4 30 10.21	8.06					
104	Bessel . . .	405	. .	40.0	53.0	6.5	. .	4 30 53.08	8.45	42.87	0.39			
105 e	Mars . . .	S.F.	. .	41.5	54.2	7.5	. .	4 31 54.31	7.13					
106	Bessel . . .	405	. .	22.5	35.5	48.8	. .	4 32 35.51	8.52	41.20	1.39			
107	Mars . . .	N.P.	. .	58.5	11.7	25.0	. .	4 35 11.64	8.27					
108	Bessel . . .	405	. .	41.5	54.7	8.0	. .	4 35 54.64	+8.80	—43.00	—0.53			

DECEMBER 16, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
109	Mars . . . S.F.	. .	38.2	51.5	4.5	. .	4 36 51.31	+7.42			28.116	74.1	59.4
110	Bessel . . . 405	. .	20.0	33.5	46.7	. .	4 37 33.31	8.88	—42.00	—1.46			
111	Mars . . . N.P.	. .	14.7	28.0	42.0	. .	4 38 28.14	8.33			Ther. att. 74°.0 Bar. red. to 32° F. 27.991		
112	Bessel . . . 405	. .	58.0	11.5	25.0	. .	4 39 11.41	8.89	43.27	0.56			
113	Mars . . . S.F.	. .	54.5	7.7	21.0	. .	4 40 7.31	7.50					
114	Bessel . . . 405	. .	37.0	49.7	3.5	. .	4 40 49.98	8.99	42.67	1.49			
115*f*	Mars . . . N.P.	. .	44.0	57.5	10.7	. .	4 41 57.31	8.48					
116	Bessel . . . 405	. .	28.0	41.0	54.3	. .	4 42 41.01	9.04	43.70	0.56			
117	Mars . . . S.F.	. .	28.7	42.0	55.5	. .	4 43 41.98	7.57					
118	Bessel . . . 405	. .	11.5	24.7	38.0	. .	4 44 24.64	9.08	42.66	1.51			
119	Mars . . . N.P.	. .	37.2	50.5	3.7	. .	4 47 50.38	8.78					
120	Bessel . . . 405	. .	21.2	34.5	48.0	. .	4 48 34.48	9.28	44.10	0.50			
121	Mars . . . N.P.	. .	20.2	33.3	47.0	. .	4 49 33.41	8.84					
122	Bessel . . . 405	. .	4.7	17.7	31.5	. .	4 50 17.21	9.34	43.80	0.50			
123	Mars . . . N.P.	. .	55.5	8.5	21.7	. .	4 51 8.48	8.89					
124	Bessel . . . 405	. .	39.5	53.0	6.5	. .	4 51 52.91	9.39	44.43	0.50			
125	Mars . . . S.F.	. .	38.0	51.5	4.7	. .	4 52 51.31	7.99					
126	Bessel . . . 405	. .	21.5	34.7	48.0	. .	4 53 34.64	9.39	43.33	1.40			
127	Mars . . . N.P.	. .	19.2	32.2	45.7	. . .	4 54 32.28	8.99					
128	Bessel . . . 405	. .	. .	17.0	30.7	43.3	4 55 17.13	9.51	44.75	0.52			
129	Mars . . . S.F.	. .	11.0	24.2	37.5	. .	4 56 24.14	8.12					
130	Bessel . . . 405	. .	54.7	7.7	21.2	. .	4 57 7.78	9.57	43.64	1.45			
131	Mars . . . N.P.	. .	48.3	1.2	14.7	. .	4 58 1.31	9.15					
132	Bessel . . . 405	. .	33.0	46.2	59.7	. .	4 58 46.21	9.59	44.90	0.44			
133	Mars . . . S.F.	. .	30.7	43.7	57.2	. .	4 59 43.78	8.22					
134	Bessel . . . 405	. .	14.3	27.7	41.0	. .	5 0 27.58	9.64	43.80	1.42			
135	Mars . . . N.P.	. .	9.5	22.5	36.0	. .	5 1 22.58	9.28					
136	Bessel . . . 405	. .	54.3	7.5	21.2	. .	5 2 7.58	9.77	45.00	0.49			
137	Mars . . . S.F.	. .	52.0	4.7	18.5	. .	5 3 4.98	8.30					
138	Bessel . . . 405	. .	36.0	49.0	2.3	. .	5 3 49.01	9.73	44.03	1.43			
139	Mars . . . N.P.	. .	28.0	41.0	54.0	. .	5 4 40.91	9.38					
140	Bessel . . . 405	. .	13.3	26.5	40.0	. .	5 5 26.51	9.85	45.60	0.47			
141	Mars . . . S.F.	. .	11.3	24.5	38.0	. .	5 6 24.51	8.50					
142	Bessel . . . 405	. .	55.5	9.0	22.3	. .	5 7 8.84	+9.87	—44.33	—1.37			

Remarks.

The observations made by me, unless where otherwise stated, are only tolerably good, both the planet and star having a wave-like motion, very frequently rendering it difficult to perfect a contact at the centre wire. J. M. G.

a Good observation.
b The remaining measures by Mr. MacRae.
c Not good, and not incorporated in the means.
d Recorded 8.0s. at wire D.
e Good.
f Micrometer recorded +7.48.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean N. P. . .	Thirty-five transits . .	4 0 27.39	—40.532	—0.611	=0 11.91
Mean S. F. . .	Thirty-four transits . .	3 59 23.18	—39.393	—1.650	=0 32.16

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A.R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 *a*	Feb. 4	λ Cancri	. . . .	. .	. .	. . .	302 5 57.63	—1 24.58	+ 1.1	. .	+24 28 59.96	M.
2		υ^2 Cancri	8 20 9.91	+0.775	—20.35	8 19 50.34	301 57 9.25	1 25.26	. .	. .	24 37 49.02	
3		δ Cancri	8 36 36.34	.635	20.35	8 36 16.63	307 53 8.40	1 8.42	. .	. .	18 41 33.03	
4	7	Bessel . . . 341	8 6 36.85	.721	20.97	8 6 16.60	301 47 55.53	1 24.04	0.2	. .	24 47 2.42	P.
5 *b*		Mars . . . . S.P.	8 7 34.07	.721	20.97	8 7 13.82	301 51 12.46	1 23.86	. .	—6.5	24 43 51.81	
6		υ^2 Cancri	8 20 10.57	.773	20.97	8 19 50.37	301 57 3.95	1 23.55	. .	. .	24 37 53.51	
7		32 Cancri	8 24 35 46	.772	20.97	8 24 15.26	301 59 53.55	1 23.37	. .	. .	24 35 3.73	
8 *c*	8	B. A. C . . . 2703	7 58 10.28	1.231	21.55	7 57 49.96	303 42 17.15	1 18.66	1.5	. .	22 52 34.12	G.
9		Mars . . . . S.F.	8 6 13.61	1.280	21.56	8 5 53.33	301 48 24.43	1 24.57	. .	—6.4	24 46 39.15	
10 *d*		Bessel . . . 341	. . . .	. .	. .	. . . .	301 48 0.43	1 24.59	. .	. .	24 46 56.77	
11		λ Cancri	8 12 4.31	1.273	21.56	8 11 44.02	302 5 57.45	1 23.62	. .	. .	24 28 58.78	
12		υ^2 Cancri	8 20 10.44	1.276	21.56	8 19 50.16	301 57 5.15	1 24.10	. .	. .	24 37 51.56	
13 *e*	9	B. A. C. . . . 2703	7 58 10.63	1.218	22.04	7 57 49.81	303 42 17.13	1 13.65	1.2	. .	22 52 34.43	G.
14		Mars . . . . N.P.	8 4 54.28	1.268	22.04	8 4 33.51	301 45 33.63	1 24.71	. .	+6.4	24 49 17.59	
15 *f*		Bessel . . . 341	8 6 36.52	1.212	22.04	8 6 15.69	301 47 59.63	1 24.57	. .	. .	24 46 57.85	
16		λ Cancri	8 12 4.57	1.260	22.05	8 11 43.78	302 5 59.88	1 23.70	. .	. .	24 28 56.73	
17		υ^2 Cancri	8 20 10.70	+1.263	22.05	8 19 49.91	301 57 4.80	—1 24.18	. .	. .	+24 37 52.29	
18		ι Argus	9 13 33.33	—1.468	22.07	9 13 9.79	25 12 30.20	+ 24.87	. .	. .	—58 39 22.16	
19 *g*	10	84 Geminorum . . .	7 44 35.75	+ .616	22.53	7 44 13.84	303 52 8.00	—1 18.28	9.8	. .	+22 42 34.59	M.
20 *h*		Mars . . . . S.F.	8 3 41.11	.703	22.53	8 3 19.28	301 43 16.88	1 24.95	. .	—6.3	24 51 38.68	
21		λ Cancri	8 12 6.14	+ .697	22.54	8 11 44.30	302 5 49.58	—1 23.76	. .	. .	+24 28 58.49	
22		ι Argus	9 13 33.59	—1.017	22.56	9 13 10.01	25 12 23.28	+ 24.94	. .	. .	—58 39 23.91	
23	11	H. C. . . . 15707	7 55 38.47	+ .723	23.06	7 55 16.13	301 39 42.05	—1 25.86	7.9	. .	+24 55 10.02	G.
24		Bessel . . . 341	7 59 47.11	.778	23.06	7 59 24.83	301 42 12.72	1 25.71	. .	. .	24 52 39.20	
25 *i*		Mars . . . . N.P.	8 2 27.33	.778	23.06	8 2 5.05	301 40 56.32	1 25.79	. .	+6.3	24 53 49.38	
26		λ Cancri	8 12 6.68	+ .770	23.07	8 11 44.38	302 5 51.08	—1 24.45	. .	. .	+24 28 59.58	
27		ι Argus	9 13 34.37	—1.217	23.10	9 13 10.05	25 12 23.13	+ 25.09	. .	. .	—58 39 22.01	
28		α Hydræ	9 20 42.49	+ .228	23.10	9 20 19.62	334 35 5.08	— 25.33	. .	. .	— 8 1 13.54	
29	13	H. C. 15707	7 55 39.97	.476	24.29	7 55 16.16	301 39 41.45	1 25.52	9.6	. .	+24 55 8.58	G.
30		Mars . . . . N.P.	8 0 11.26	.476	24.29	7 59 47.45	301 37 23.38	1 25.65	. .	6.2	24 57 20.58	
31		λ Cancri	8 12 8.27	+ .470	24.29	8 11 44.45	302 5 49.13	—1 24.17	. .	. .	+24 28 59.55	
32		ι Argus	9 13 35.19	— .817	24.32	9 13 10.05	25 12 23.65	+ 24.99	. .	. .	—58 39 24.13	
33		α Hydræ	9 20 43.81	+ .126	24.32	9 20 19.62	334 35 6.35	— 25.23	. .	. .	— 8 1 16.61	
34	14	Bessel . . . 341	7 55 28.71	.198	25.06	7 55 3.85	301 34 34.23	1 26.23	6.3	. .	+25 0 19.81	M.
35 *k*		H. C. 15707	7 55 40.89	.198	25.06	7 55 16.03	301 39 46.86	1 25.94	. .	. .	24 55 6.89	
36 *l*		Mars . . . . N.P.	7 59 7.73	.253	25.06	7 58 42.92	301 35 59.73	1 26.15	. .	6.2	24 58 48.03	
37		λ Cancri	8 12 9.13	+ .250	25.07	8 11 44.31	302 5 51.93	—1 24.52	. .	. .	+24 29 0.40	
38		ι Argus	9 13 35.49	— .456	25.09	9 13 9.94	25 12 27.00	+ 25.12	. .	. .	—58 39 24.31	
39	15	Bessel . . . 341	7 55 29.08	+ .226	25.44	7 55 3.87	301 34 40.58	—1 26.33	4.7	. .	+25 0 15.16	G.
40 *m*		H. C. 15707	7 55 41.29	.226	25.44	7 55 16.08	301 39 52.71	1 26.04	. .	. .	24 55 2.74	
41 *n*		Mars . . . . N.P.	7 58 6.87	.282	25.44	7 57 41.71	301 34 52.18	1 26.32	. .	+6.2	24 59 57.35	
42		λ Cancri	8 12 9.38	.277	25.44	8 11 44.22	302 5 54.93	1 24.61	. .	. .	24 28 59.09	
43	16	Bessel . . . 341	7 55 29.44	.250	25.82	7 55 3.87	301 34 38.90	1 26.07	+ 4.9	. .	25 0 16.38	M.
44 *o*		H. C. 15707	7 55 41.57	.250	25.82	7 55 16.00	301 39 49.03	1 25.79	. .	. .	24 55 5.97	
45 *p*		Mars . . . . S.F.	7 57 10.33	+0.253	—25.82	7 56 44.76	301 34 2.30	—1 26.11	. .	—6.1	+25 0 59.12	

a λ Cancri, 5th wire, + 1.35 rev. = 4′ 51″.93.

b Mars S. P., 5th wire, — 2.05 rev. = 3′ 16″.93. Recorded north limb. There is evidently an error in the R.A. of Bessel 341, not now explicable.

c The axis was lowered during the afternoon, leaving the east end high 0.72 div. and image of wire D, 0.11 rev. west.

d Bessel 341, north of Mars S. F., 0.86 rev. = 24″.00.

e The pulley being broken, the north roof door could not be opened.

f Bessel 341, south of Mars S. P., 5.23 rev. = 2′ 26″.00.

g The azimuth was changed before observations.

h Diameter of Mars, 0.50 rev. = 14″.00.

i Mars N. P., north of Bessel 341, 2.73½ rev. = 1′ 16″.45.

k H. C. 15707, 5th wire, + 2.09 = 5′ 12″.63.

l Mars N. P., 4th wire + 3.06 rev. = 1′ 25″.50.

m H. C. 15707, 5th wire, + 2.07½ rev. = 5′ 12″.13.

n Mars N. P., south of Bessel 341, 0.41½ rev. = 11″.65.

o H. C. 15707, 5th wire, + 2.00 rev. = 5′ 10″.13.

p Mars S. F., 4th wire, — 1.31 rev. = 36″.60.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A.R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Feb. 16	λ Cancri	8 12 9.91	+0.302	−25.82	8 11 44.39	302 5 54.45	−1 24.36	+4.9	. .	+24 28 59.12	M.
2		ι Argus	9 13 36.47	− .580	25.84	9 13 10.05	25 12 31.08	+ 25.10	. .	. .	−58 39 26.97	
3		α Hydræ	9 20 45.46	+ .073	25.85	9 20 19.68	334 35 9.93	− 25.37	. .	. .	− 8 1 15.35	
4	17	Bessel . . . 341	7 55 29.85	.640	26.40	7 55 4.09	301 34 35.70	1 26.46	6.9	. .	+25 0 17.97	P.
5 *a*		Mars . . . . N.P.	7 56 14.83	.641	26.40	7 55 49.07	301 32 59.30	1 26.55	. .	+6.1	25 1 48.36	
6		λ Cancri	8 12 10.21	+ .688	26.40	8 11 44.50	302 5 53.05	−1 24.74	. .	. .	+24 28 58.90	
7		ι Argus	9 13 37.39	− .920	26.43	9 13 10.04	25 12 29 33	+ 25.11	. .	. .	−58 39 27.23	
8		α Hydræ	9 20 45.83	+ .253	26.43	9 20 19.65	334 35 10.97	− 25.37	. .	. .	− 8 1 18.39	
9	18	Mars . . . . S.F.	7 55 24.85	.551	27.00	7 54 58.40	301 32 41.23	1 27.67	6.0	−6.0	+25 2 20.55	M.
10 *b*		Bessel . . . 341	7 55 30.36	.551	27.00	7 55 3.91	301 34 31.33	1 27.56	. .	. .	25 0 21.34	
11		λ Cancri	8 12 10.76	.597	27.01	8 11 44.35	302 5 52.77	1 25.92	. .	. .	24 29 1.26	
12		υ^1 Cancri	8 18 18.20	+ .548	27.01	8 17 51.74	301 33 58.15	−1 27.71	. .	. .	+25 0 57.67	
13		ι Argus	9 13 37.90	− .874	27.02	9 13 10.00	25 12 28.70	+ 25.56	. .	. .	−58 39 26.15	
14		α Hydræ	9 20 46.49	+ .202	27.02	9 20 19.67	334 35 11.60	− 25.79	. .	. .	− 8 1 17.70	
15	19	Mars . . . . N.P.	7 54 36.15	.259	27.11	7 53 9.30	301 32 3.75	1 26.45	3.5	+6.0	+25 2 47.31	P.
16 *c*		Bessel . . . 341	7 55 30.80	.259	27.11	7 55 3.95	301 34 34.08	1 26.31	. .	. .	25 0 22.84	
17		λ Cancri	8 12 11.11	.309	27.12	8 11 44.30	302 5 55.38	1 24.58	. .	. .	24 28 59.81	
18 *d*		υ^1 Cancri	8 18 18.61	.314	27.12	8 17 51.80	301 33 57.40	1 26.34	. .	. .	25 0 59.55	
19	20	Mars . . . . S.F.	7 53 52.59	.311	27.59	7 53 25.31	301 32 10.33	1 26.21	2.9	−5.9	25 2 52.99	M.
20 *e*		Bessel . . . 341	7 55 31.03	.255	27.59	7 55 3.70	301 34 38.16	1 26.07	. .	. .	25 0 19.12	
21		λ Cancri	8 12 11.46	.307	27.60	8 11 44.17	302 5 54.15	1 24.35	. .	. .	24 29 1.41	
22 *f*		υ^1 Cancri	8 18 18.86	.311	27.60	8 17 51.57	301 34 59.28	1 26.05	. .	. .	24 59 57.98	
23	21	82 Geminorum . . .	7 40 10.13	.291	27.64	7 39 42.78	303 4 41.62	1 20.21	6.4	. .	23 30 6.30	P.
24		Mars . . . . N.P.	7 53 10.46	.302	27.64	7 52 43.12	301 31 54.95	1 25.25	. .	+5.9	25 2 52.11	
25 *g*		Bessel . . . 341	7 55 31.15	.246	27.64	7 55 3.76	301 34 37.45	1 25.10	. .	. .	25 0 15.36	
26		λ Cancri	8 12 11.60	.298	27.64	8 11 44.26	302 5 53.45	1 23.51	. .	. .	24 28 57.77	
27	22	82 Geminorum . . .	7 40 10.26	.290	27.93	7 39 42.62	303 4 44.55	1 20.97	2.7	. .	23 30 7.83	G.
28		Mars . . . . N.P.	7 52 32.47	.301	27.93	7 52 4.84	301 32 13.42	1 25.91	. .	5.8	25 2 38.10	
29 *h*		Bessel . . . 341	7 54 42.53	.301	27.93	7 54 14.90	301 35 7.42	1 25.74	. .	. .	24 59 49.73	
30		λ Cancri	8 12 11.60	.297	27.94	8 11 43.96	302 5 55.83	1 24.06	. .	. .	24 28 59.64	
31	23	82 Geminorum . . .	7 40 10.74	.288	28.22	7 39 42.81	303 4 45.50	1 21.55	4.6	. .	23 30 5.56	P.
32		Mars . . . . N.P.	7 51 58.59	.299	28.22	7 51 30.67	301 32 38.12	1 26.57	. .	+5.8	25 2 12.16	
33		Bessel . . . 341	7 55 31.70	.246	28.22	7 55 3.73	301 34 38.68	1 26.45	. .	. .	25 0 17.28	
34		λ Cancri	8 12 12.14	.295	28.23	8 11 44.21	302 5 55.52	1 24.86	. .	. .	24 28 58.85	
35	24	82 Geminorum . . .	7 40 11.16	.295	28.71	7 39 42.75	303 4 43.25	1 20.80	4.7	. .	23 30 6.96	M.
36		Mars . . . . S.F.	7 51 28.93	.306	28.71	7 51 0.53	301 33 26.80	1 25.65	. .	−5.7	25 1 33.96	
37		λ Cancri	8 12 12.64	.304	28.72	8 11 44.22	302 5 53.65	1 23.88	. .	. .	+24 28 59.64	
38.	25	α Canis Maj. . . .	6 39 6.93	.020	28.99	6 38 37.96	343 4 58.50	16.08	4.5	. .	−16 31 12.81	P.
39		82 Geminorum . . .	7 40 11.44	.302	29.00	7 39 42.74	303 4 43.85	1 21.08	. .	. .	+23 30 6.84	
40		Bessel . . . 341	7 47 34.90	.314	29.00	7 47 6.21	301 31 54.00	1 26.04	. .	. .	25 3 1.65	
41		Mars . . . . N.P.	7 50 50.54	.313	29.00	7 50 21.85	301 33 57.43	1 25.91	. .	+5.7	25 0 52.39	
42		B. A. C. . . . 2703	7 58 18.87	.297	29.01	7 57 50.16	303 42 12.72	1 19.22	. .	. .	22 52 36.11	
43	26	82 Geminorum . . .	7 40 11.91	.278	29.40	7 39 42.79	303 4 43.42	1 20.17	+5.1	. .	23 30 5.76	M.
44		Bessel . . . 341	7 47 35.33	.291	29.40	7 47 6.22	301 31 52.20	1 25.07	. .	. .	25 3 1.88	
45 *i*		Mars . . . . S.F.	7 50 37.57	+0.290	−29.40	7 50 8.46	301 35 5.23	−1 24.90	. .	−5.6	+24 59 54.28	

a Mars N. P., 4th wire, + 3.45 rev. = 1′ 36″.40.
b Bessel 341, 4th wire, + 4.05 rev. = 1′ 53″.10.
c Bessel 341, 5th wire, — 3.72 rev. = 2′ 30″.33.
d υ^1 Cancri. Double; observed south, preceding star.
e Bessel 341, 5th wire, — 3.81 rev. = 2′ 27″.83.

f Bessel 341, south of Mars 5.82 rev. = 2′ 42″.50.
g υ^1 Cancri. Observed south, preceding star.
h This was mistaken for Bessel 341, south of Mars N. P., 6.23 rev. = 2′ 54″.00.
i Mars S. F., 5th wire, — 2.19 rev. = 3′ 13″.03.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Feb. 26	ι Argus	9 13 39.94	—0.633	—29.42	9 13 9.89	25 12 33.88	+ 24.65	+5.1	. .	—58 39 29.52	M.
2		α Hydræ	9 20 48.97	+ .047	29.42	9 20 19.60	334 35 12.05	— 24.88	. .	. .	— 8 1 18.16	
3	27	82 Geminorum . . .	7 40 11.90	.261	29.45	7 39 42.71	303 4 42.62	1 20.40	5.1	. .	+23 30 6.79	P.
4		Bessel . . . 341	7 47 35.34	.274	29.45	7 47 6.16	301 31 53.88	1 25.37	. .	. .	25 3 0.50	
5 *a*		Mars . . . . N.P.	7 50 15.84	.272	29.45	7 49 46.66	301 35 59.71	1 25.15	. .	+5.6	24 58 48.85	
6		B. A. C. . . . 2703	7 58 19.23	.255	29.45	7 57 50.03	303 42 11.75	1 18.60	. .	. .	22 52 35.86	
7	28	82 Geminorum . . .	7 40 12.39	.330	29.92	7 39 42.80	303 4 45.08	1 21.63	5.2	. .	23 30 5.46	M.
8		Bessel . . . 341	7 49 8.31	.288	29.92	7 48 38.68	301 40 46.68	1 26.14	. .	. .	24 54 8.37	
9		Mars . . . . S.F.	7 49 59.89	.289	29.92	7 49 30.26	301 37 30.67	1 26.32	. .	—5.5	24 57 30.06	
10		B. A. C. . . . 2703	7 58 19.88	+ .325	29.92	7 57 50.28	303 42 14.00	—1 19.69	. .	. .	+22 52 34.60	
11		ι Argus	9 13 40.69	— .726	29.94	9 13 10.02	25 12 33.48	+ 25.15	. .	. .	—58 39 29.72	
12		α Hydræ	9 20 49.54	+ .059	29.95	9 20 19.65	334 35 13.08	— 25.38	. .	. .	— 8 1 18.79	
13	29	82 Geminorum . . .	7 40 12.76	.112	30.28	7 39 42.59	303 4 47.78	1 22.32	4.3	. .	+23 30 4.35	G.
14		Bessel . . . 341	7 49 8.58	.119	30.28	7 48 38.42	301 40 46.43	1 26.88	. .	. .	24 54 10.26	
15 *b*		Mars . . . . N.P.	7 49 45.02	.064	30.28	7 49 14.81	301 38 34.90	1 27.00	. .	+5.5	24 56 16.41	
16	Mar. 1	Bessel . . . 341	7 49 8.90	.006	30.33	7 48 38.58	301 40 42.78	1 25.19	3.8	. .	24 54 12.72	G.
17 *c*		Mars . . . . S.F.	7 49 35.31	.006	30.33	7 49 4.99	301 40 28.58	1 25.20	. .	—5.4	24 54 32.33	
18		Bessel . . . 341	7 55 33.64	.061	30.34	7 55 3.36	301 34 35.58	1 25.64	. .	. .	25 0 20.37	
19	2	Bessel . . . 341	7 49 9.58	.166	30.83	7 48 38.92	301 40 43.70	1 24.17	5.2	. .	24 54 9.38	P.
20 *d*		Mars . . . . N.P.	7 49 27.46	.221	30.83	7 48 56.85	301 41 51.56	1 24.28	. .	+5.4	24 52 56.23	
21		Bessel . . . 341	7 55 34.44	+ .222	30.83	7 55 3.83	301 34 33.62	—1 24.68	. .	. .	+25 0 19.97	
22		ι Argus	9 13 41.33	— .619	30.86	9 13 9.85	25 12 37.60	+ 24.73	. .	. .	—58 39 32.92	
23		α Hydræ	9 20 50.49	+ .002	30.86	9 20 19.63	334 35 13.43	— 24.96	. .	. .	— 8 1 19.56	
24	3	Bessel . . . 341	7 49 10.09	.224	31.17	7 48 39.15	301 40 45.05	1 25.25	4.8	. .	+24 54 9.51	G.
25 *e*		Mars . . . . N.P.	7 49 23.31	.279	31.17	7 48 52.42	301 43 48.85	1 25.08	. .	5.3	24 51 0.24	
26*		Bessel . . . 341	7 54 46.11	.225	31.17	7 54 15.17	301 35 1.38	1 25.68	. .	. .	24 59 53.61	
27	4	Mars . . . . N.P.	7 49 22.40	.335	31.51	7 48 51.23	301 45 49.02	1 24.72	5.3	5.3	24 48 59.21	P.
28		Bessel . . . 341	7 55 35.14	+ .281	31.51	7 55 3.91	301 34 34.82	—1 25.34	. .	. .	+25 0 19.33	
29		ι Argus	9 13 42.23	— .808	31.53	9 13 9.89	25 12 36.12	+ 24.81	. .	. .	—58 39 32.12	
30		α Hydræ	9 20 51.20	+ .029	31.53	9 20 19.70	334 35 12.48	— 25.03	. .	. .	— 8 1 18.64	
31	6	H. C. 15401	7 47 8.94	.184	32.22	7 46 36.90	301 50 4.42	1 24.35	5.0	. .	+24 44 49.04	P.
32 *f*		Mars . . . . N.P.	7 49 29.97	.184	32.22	7 48 57.93	301 50 12.22	1 24.34	. .	+5.2	24 44 36.03	
33		Bessel . . . 341	7 55 35.52	.130	32.22	7 55 3.43	301 34 36.40	1 25.20	. .	. .	25 0 17.91	
34	7	Mars . . . . S.F.	7 49 38.91	.479	32.36	7 49 7.03	301 52 52.30	1 25.06	5.5	—5.2	24 42 6.57	G.
35		Bessel . . . 341	7 55 35.53	+ .427	32.36	7 55 3.60	301 34 34.95	—1 26.07	. .	. .	+25 0 19.73	
36		ι Argus	9 13 43.24	—1.160	32.37	9 13 9.71	25 12 34.33	+ 25.14	. .	. .	—58 39 30.86	
37		α Hydræ	9 20 51.87	+ .033	32.37	9 20 19.53	334 35 13.20	— 25.35	. .	. .	— 8 1 19.24	
38	8	H. C. 15412	7 47 29.71	.364	32.50	7 46 57.57	301 58 5.68	1 25.51	5.3	. .	+24 36 48.64	P.
39 *g*		Mars . . . . N.P.	7 49 49.61	.364	32.50	7 49 17.47	301 55 7.18	1 25.67	. .	+5.1	24 39 42.20	
40		Bessel . . . 341	7 55 36.00	+ .369	32.50	7 55 3.87	301 34 37.10	—1 26.81	. .	. .	+25 0 18.52	
41		ι Argus	9 13 43.37	—1.016	32.50	9 13 9.85	25 12 35.55	+ 25.33	. .	. .	—58 39 32.07	
42		α Hydræ	9 20 52.23	— .007	32.50	9 20 19.72	334 35 12.20	— 25.56	. .	. .	— 8 1 17.83	
43	9	H. C. 15412	7 47 29.74	+ .270	32.50	7 46 57.51	301 58 6.75	1 23.57	+4.1	. .	+24 36 46.83	G.
44 *h*		Mars . . . . S.F.	7 50 4.41	+0.270	—32.50	7 49 32.18	301 57 59.75	—1 23.57	. .	—5.1	+24 36 58.93	

a Mars N. P., 5th wire, — 0.30 rev. = 4′ 5″.83.
b Mars N. P., north of Bessel 341, 4.71 rev. = 2′ 11″.50.
c Mars S. F., north of Bessel 341, 0.51 rev. = 14″.20.
d Mars N. P., south of Bessel 341, 2.43 rev. = 1′ 7″.86.
e Mars N. P., south of Bessel 341, 6.58 rev. = 3′ 3″.80.
f Mars N. P., south of H. C. 15401, 0.28 rev. = 7″.80.
g Mars N. P., 4th wire, — 6.39 rev. = 2′ 58″.50.
h Mars S. F., north of H. C. 15412, 0.25 rev. = 7″.00.
* This confirms the third observation of February 22, and the Ephemeris is presumed to be in error — 35″.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 a	March 9	Greenwich . . 485	8 50 58.47	+0.241	—32.50	8 50 26.21	304 50 34.68	—1 15.26	+ 4.1	. .	+21 44 10.59	G.
2 b		Bessel . . . 275	8 58 49.24	.234	32.50	8 58 16.97	305 28 23.83	1 13.53	. .	. .	21 6 19.71	
3 c		Bessel . . . 275	9 5 0.69	+ .229	32.50	9 4 28.42	305 55 36.65	—1 12.32	. .	. .	+20 39 5.68	
4		ι Argus	9 13 43.16	— .911	32 50	9 13 9.75	25 12 38.38	+ 24.73	. .	. .	—58 39 33.10	
5		α Hydræ	9 20 52.18	+ .045	32.50	9 20 19.73	334 35 15.62	— 24.99	. .	. .	— 8 1 20.62	
6	10	H. C. 15412	7 47 29.81	.545	32.73	7 46 57.63	301 58 5.82	1 24.70	5.2	. .	+24 36 47.79	P.
7 d		Mars . . . . N.P.	7 50 20.56	.543	32.73	7 49 48.37	302 0 32.72	1 24.56	. .	+5.0	24 34 15.75	
8		Greenwich . . 485	8 50 58.47	.501	32.74	8 50 26.23	304 50 35.12	1 16.13	. .	. .	21 44 9.92	
9		Bessel . . . 275	8 58 49.39	.492	32.74	8 58 17.14	305 28 23.98	1 14.37	. .	. .	21 6 19.30	
10		Bessel . . . 275	9 4 59.77	.431	32.74	9 4 27.46	305 57 8.23	1 13.14	. .	. .	20 37 33.82	
11 e		Bessel . . . 275	9 5 0.81	+ .431	32.74	9 4 28.50	305 55 38.02	—1 13.15	. .	. .	+20 39 4.04	
12		ι Argus	9 13 43.66	—1.129	32.74	9 13 9.79	25 12 37.58	+ 25.03	. .	. .	—58 39 33.70	
13		α Hydræ	9 20 52.30	+ .090	32.74	9 20 19.65	334 35 14.50	— 25.26	. .	. .	— 8 1 20.33	
14	11	Mars . . . . S.F.	7 50 41.39	.077	32.89	7 50 8.58	302 3 39.88	1 24.63	4.5	—5.0	+24 34 19.36	M.
15	12	Mars . . . . N.P.	7 51 3.16	.403	32.97	7 50 30.59	302 6 25.75	1 23.84	4.4	+4.9	24 28 22.90	P.
16 f		Bessel . . . 339	7 51 32.52	.348	32.97	7 50 59.90	302 6 27.98	1 23.84	. .	. .	24 28 25.57	
17		Greenwich . . 485	8 50 58.81	.435	32.97	8 50 26.28	304 50 34.62	1 15.53	4.5	. .	21 44 10.52	
18		Bessel . . . 275	8 58 49.66	.358	32.97	8 58 17.05	305 28 21.75	1 13.79	. .	. .	21 6 21.65	
19		Bessel . . . 275	9 5 1.13	+ .353	32.98	9 4 28.50	305 55 35.08	—1 12.58	. .	. .	+20 39 7.11	
20		ι Argus	9 13 43.81	—1.051	32.98	9 13 9.79	25 12 38.38	+ 24.91	. .	. .	—58 39 33.68	
21		α Hydræ	9 20 52.66	+ .011	32.98	9 20 19 69	334 35 13.58	— 25.13	. .	. .	— 8 1 18.74	
22	13	H. C. 15401	7 47 9.81	.416	33.12	7 46 37.11	301 50 3.10	1 24.27	4.0	. .	+24 44 51.28	M.
23		Mars . . . . S.F.	7 51 29.45	.412	33.12	7 50 56.74	302 9 44.50	1 23.21	. .	—4.9	24 25 13.72	
24 g		Bessel . . . 339	7 51 32.56	.413	33.12	7 50 59.85	302 6 27.39	1 23.39	. .	. .	24 28 26.11	
25		Bessel . . . 341	7 59 57.30	.419	33.12	7 59 24.60	301 42 13.38	1 24.79	3.9	. .	24 52 41.62	
26		Bessel . . . 341	8 6 48.91	.472	33.12	8 6 16.26	301 47 54.78	1 24.48	. .	. .	24 46 59.91	
27		λ Cancri	8 12 16.74	.468	33.12	8 11 44.09	302 5 50.20	1 23.55	. .	. .	24 29 3.56	
28 h		Washington . . .	8 13 42.94	.413	33.12	8 13 10.23	302 5 28.40	1 23.58	. .	. .	24 29 25.39	
29		Bessel . . . 344	8 28 47.68	.459	33.12	8 28 15.02	302 49 15.52	1 21.18	. .	. .	23 45 35.87	
30		Bessel . . . 344	8 35 39.93	.449	33.12	8 35 7.26	303 20 19.52	1 19.83	. .	. .	23 14 30.52	
31		Bessel . . . 344	8 40 50.89	.388	33.12	8 40 18.16	303 50 7.68	1 18.38	. .	. .	22 44 40.91	
32 i		Bessel . . . 344	8 40 55.41	.387	33.12	8 40 22.68	303 52 44.09	1 18.26	. .	. .	22 42 4.38	
33		Bessel . . . 278	8 49 27.71	.431	33.12	8 48 55.02	304 39 50.20	1 16.06	. .	. .	21 54 56.07	
34		Bessel . . . 278	9 0 0.81	.425	33.13	8 59 28.11	305 5 24.80	1 14.92	. .	. .	21 29 20.25	
35		Rumker . . . 2799	9 8 13.59	.414	33.13	9 7 40.87	305 53 35.50	1 12.77	. .	. .	20 41 7.48	
36		B. A. C. . . . 3181	9 12 51.27	.348	33.13	9 12 18.49	306 51 53.20	1 10.28	. .	. .	19 42 47.29	
37	14	Mars . . . . N.P.	7 51 56.29	.394	32.65	7 51 24.03	302 12 48.12	1 23.17	3.5	+4.9	24 22 0.76	G.
38 k		H. C. 15608	7 53 11.06	.393	32.65	7 52 38.80	302 15 55.02	1 23.00	. .	. .	24 18 58.59	
39		Anon	9 3 53.08	+ .364	32.64	9 3 20.80	305 37 24.18	—1 13.61	. .	. .	+20 57 20.04	
40		ι Argus	9 13 43.59	—1.349	32.64	9 13 9.60	25 12 36.92	+ 24.88	. .	. .	—58 39 31.19	
41		α Hydræ	9 20 52.20	+ .038	32.64	9 20 19.52	334 35 14.20	— 25.12	. .	. .	— 8 1 18.47	
42	15	H. C. 15401	7 47 9.10	.198	32.72	7 46 36.58	301 50 5.32	1 25.31	+ 4.8	. .	+24 44 49.30	M.
43		Mars . . . . S.F.	7 52 27.77	.193	32.72	7 51 55.24	302 16 20.58	1 24.00	. .	—4.8	24 18 37.53	
44 l		H. C. 15608	7 53 11.04	.139	32.72	7 52 38.51	302 15 56.28	1 24.02	. .	. .	24 18 57.05	
45		Bessel . . . 341	7 59 56.75	.145	32.72	7 59 24.18	301 42 13.95	1 25.94	. .	. .	24 52 41.30	
46		λ Cancri	8 12 16.36	.140	32.72	8 11 43.78	302 5 50.75	1 24.59	. .	. .	24 29 3.15	
47 m		Washington . . .	8 13 42.46	.140	32.72	8 13 9.88	302 5 35.35	1 24 61	. .	. .	24 29 18.57	
48		Washington . . .	8 28 4.26	+0.190	—32.72	8 27 31.73	302 36 47.28	—1 22.97	. .	. .	+23 58 5.00	

a Greenwich 485, comparing star, January 8.
b Bessel 275, comparing star, January 2.
c Bessel 275, comparing star, December 28.
d Mars N. P., north of H. C. 15412, 5.35 rev. = 2′ 29″.41.
e Bessel 275, south of preceding star, 3.23 rev. = 1′ 30″.21.
f Bessel 339, south of Mars N. L., 0.08 rev. = 0′ 2″.23.
g Bessel 339, 3d wire, — 2.10 rev. = 3′ 17″.11.
h Washington, 4th wire, — 0.78 rev. = 0′ 21″.80.
i Bessel 344, 3d wire, — 3.56 rev. = 2′ 36″.41.
k H. C. 15608, south of Mars N. P., 6.69 rev. = 3′ 6″.90.
l H. C. 15608, north of Mars S. F., + 0.87 rev. = 0′ 24″.30.
m Washington, 4th wire, — 0.55 rev. = 0′ 15″.40.

No for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Mar. 15	Bessel . . . 344	8 35 39.44	+0.182	−32.72	8 35 6.90	302 20 21.22	−1 20.73	+ 4.8	. .	+23 14 28.82	M.
2		Bessel . . . 344	8 40 50.64	.177	32.72	8 40 18.10	303 50 8.42	1 19.23	. . .	. .	22 44 40.12	
3		Bessel . . . 278	8 47 58.83	.171	32.72	8 47 26.28	304 19 33.50	1 17.82	. . .	. .	22 15 13.62	
4		Bessel . . . 278	8 54 19.88	.164	32.72	8 53 47.32	305 0 40.48	1 15.90	. . .	. .	21 34 4.73	
5		Bessel . . . 278	9 0 0.31	.164	32.72	8 59 27.75	305 5 27.35	1 15.70	. . .	. .	21 29 17.66	
6		Rumker . . . 2800	9 8 15.56	.153	32.72	9 7 42.99	306 7 0.58	1 12.93	. . .	. .	20 27 41.66	
7		B. A. C. . . . 3181	9 12 50.70	.092	32.72	9 12 18.07	306 51 53.55	1 11.01	. . .	. .	19 42 46.77	
8	16	Bessel . . . 341	8 6 48.57	.438	32.41	8 6 16.60	301 47 54.58	1 25.34	6.2	. .	24 46 58.67	P.
9		Washington . . .	8 20 19.63	.375	32.41	8 19 47.60	302 25 15.22	1 23.32	. . .	. .	24 9 36.01	
10		Washington . . .	8 28 4.33	.425	32.41	8 27 32.35	302 36 46.22	1 22.75	. . .	. .	23 58 4.44	
11		Bessel . . . 344	8 40 54.90	.353	32.40	8 40 22.85	303 47 33.22	1 19.14	. . .	. .	22 47 13.83	
12		Bessel . . . 278	8 47 58.83	.399	32.40	8 47 26.83	304 19 31.70	1 17.61	. . .	. .	22 15 13.82	
13		Bessel . . . 278	8 54 20.07	.389	32.40	8 53 48.06	305 0 38.72	1 15.65	. . .	. .	21 34 4.84	
14		Bessel . . . 277	9 3 52.46	.382	32.40	9 3 20.44	305 33 0.40	1 14.17	. . .	. .	21 1 41.68	
15		Washington . . .	9 8 47.23	+ .316	32.40	9 8 15.15	306 19 9.88	−1 12.11	. . .	. .	+20 15 30.14	
16		ι Argus	9 13 43.31	−1.236	32.40	9 13 9.67	25 12 37.85	+ 25.01	. . .	. .	−58 39 34.95	
17		α Hydræ	9 20 52.10	− .018	32.40	9 20 19.52	334 35 13.60	− 25 24	. . .	. .	− 8 1 20.45	
18	18	Bessel . . . 341	8 6 48.34	+ .374	32.53	8 6 16.18	301 47 55.98	−1 27.72	5.8	. .	+24 47 0.05	P.
19		Bessel . . . 344	8 16 40.94	.423	32.53	8 16 8.83	302 9 50.92	1 26.49	. . .	. .	24 25 3.88	
20		H. C. 17513	8 46 0.63	.398	32.53	8 45 28.50	303 43 12.90	1 21.65	. . .	. .	22 51 37.06	
21		Bessel . . . 278	8 52 45.82	.331	32.53	8 52 13.62	304 32 20.20	1 19.25	. . .	. .	22 2 27.36	
22		Bessel . . . 275	8 58 49.23	.370	32.53	8 58 17.07	305 28 24.90	1 16.56	. . .	. .	21 6 19.97	
23		Bessel . . . 275	9 5 0.46	+ .363	32.53	9 4 28.29	305 55 37.15	−1 15.30	. . .	. .	+20 39 6.46	
24		ι Argus	9 13 43.39	−1.318	32.53	9 13 9.54	25 12 37.52	+ 25.78	. . .	. .	−58 39 34.99	
25		α Hydræ	9 20 52.16	− .049	32.53	9 20 19.58	334 35 14.25	− 26.01	. . .	. .	− 8 1 19.93	
26	19	H. C. 15608	7 53 10.83	+ .379	32.69	7 52 38.52	302 15 57.00	1 24.79	4.1	. .	+24 18 57.80	M.
27		Bessel . . . 341	8 6 48.59	.331	32.70	8 6 16.22	301 47 57.80	1 26.49	. . .	. .	24 46 58.70	
28		Washington . . .	8 28 35.71	.370	32.70	8 28 3.38	303 0 37.92	1 22.73	. . .	. .	23 34 14.82	
29		Bessel . . . 278	8 44 48.16	.302	32.70	8 44 15.76	304 1 17.38	1 19.87	. . .	. .	22 33 32.50	
30		Bessel . . . 278	8 50 58.33	.345	32.70	8 50 25.98	304 50 36.30	1 17.46	. . .	. .	21 44 11.17	
31		H. C. 18132	9 4 49.41	+ .338	32.71	9 4 17.04	305 17 57.92	−1 16.17	. . .	. .	+21 16 48.26	
32		ι Argus	9 13 43.20	−1.157	32.71	9 13 9.33	25 12 42.10	+ 25.47	. . .	. .	−58 39 37.56	
33	20	Washington . . .	8 28 35.89	+ .383	32.95	8 28 3.32	303 0 35.90	−1 21.72	3.9	. .	+23 34 16.03	P.
34		H. C. 17513	8 46 0.61	.425	32.96	8 45 28.08	303 43 14.40	1 19.56	. . .	. .	22 51 35.37	
35		Bessel . . . 278	8 52 46.30	.358	32.96	8 52 13.70	304 32 20.00	1 17.12	. . .	. .	22 2 27.33	
36		Bessel . . . 275	8 58 49.53	.398	32.96	8 58 16.97	305 28 23.38	1 14.50	. . .	. .	21 6 21.33	
37		Bessel . . . 275	9 5 0.87	.390	32.96	9 4 28.30	305 55 36.88	1 13.27	. . .	. .	20 39 6.60	
38		Bessel . . . 275	9 10 54.86	+ .327	32.96	9 10 22.23	306 32 20.00	−1 11.82	. . .	. .	+20 2 22.03	
39		ι Argus	9 13 43.75	−1.370	32.96	9 13 9.42	25 12 40.65	+ 25.11	. . .	. .	−58 39 35.55	
40		α Hydræ	9 20 52.47	+ .017	32.96	9 20 19.49	334 35 14.35	− 25.33	. . .	. .	− 8 1 18.81	
41	22	Washington . . .	8 20 20.05	.341	33.22	8 19 47.17	302 25 11.38	1 23.08	5.5	. .	+24 9 40.31	P.
42		Washington . . .	8 28 36.03	.332	33.22	8 28 3.14	303 0 34.18	1 21.31	. . .	. .	23 34 15.74	
43		Bessel . . . 278	8 47 59.31	.366	33.22	8 47 26.46	304 19 31.82	1 17.51	. . .	. .	22 15 14.30	
44		H. C. 18132	9 4 49.80	+ .351	33.22	9 4 16.93	305 17 53.90	−1 14.76	. . .	. .	+21 16 49.47	
45		ι Argus	9 13 43.84	−1.320	33.22	9 13 9.30	25 12 40.18	+ 24.98	. . .	. .	−58 39 36.55	
46		α Hydræ	9 20 52.70	− .065	33.22	9 20 19.41	334 35 15.25	− 25.25	. . .	. .	− 8 1 21.39	
47	23	Bessel . . . 339	7 51 32.68	+0.451	−33.41	7 50 59.72	302 6 26.60	−1 24.33	+ 5.1	. .	+24 28 26.74	M.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for		Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
				Inst.	Clock.							
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Mar. 23	Washington	8 21 28.44	+0.444	−33.41	8 20 55.47	302 29 17.42	−1 23.36	+ 5.1	. .	+24 5 34.95	M.
2		Washington	8 30 44.88	.433	33.41	8 30 11.90	303 10 28.52	1 21.28	. .	. .	23 24 21.77	
3		Bessel . . . 278	8 44 48.48	.471	33.41	8 44 15.54	304 1 12.80	1 18.83	. .	. .	24 33 35.04	
4		Bessel . . . 275	9 5 0.28	.386	33.41	9 4 27.26	305 57 5.05	1 13.43	. .	. .	20 37 37.39	
5 a		Bessel . . . 275	9 5 1.21	+ .386	33.41	9 4 28.19	305 55 33.75	−1 13.50	. .	. .	+20 39 8.76	
6		ι Argus	9 13 44.09	−1.493	33.41	9 13 9.19	25 12 40.08	+ 25.14	. .	. .	−58 39 36.21	
7	25	Bessel . . . 341	7 55 48.73	+ .538	33.25	7 55 16.02	301 39 43.35	−1 25.43	5.0	. .	+24 55 11.19	M.
8		Washington	8 20 20.28	.532	33.25	8 19 47.56	302 25 11.82	1 23.15	. .	. .	24 9 40.44	
9		Washington	8 30 44.64	.580	33.25	8 30 11.97	303 10 30.58	1 20.78	. .	. .	23 24 19.31	
10		Bessel . . . 278	8 44 1.08	.517	33.25	8 43 28.35	304 1 16.70	1 18.39	. .	. .	22 33 30.80	
11 b		Bessel . . . 278	8 44 48.44	.517	33.25	8 44 15.71	304 1 18.40	1 18.39	. .	. .	22 33 29.10	
12 c		Bessel . . . 278	8 46 31.24	.515	33.25	8 45 58.51	304 12 7.12	1 17.86	. .	. .	22 22 39.85	
13 a		Bessel . . . 275	9 5 0.14	.501	33.25	9 4 27.39	305 57 5.45	1 13.13	. .	. .	20 37 36.79	
14 d		Bessel . . . 275	9 5 1.26	.501	33.25	9 4 28.51	305 55 35.25	1 13.19	. .	. .	20 39 7.05	
15*	26	Washington	8 21 27.65	.609	33.26	8 20 55.00	302 29 26.00	1 22.40	4.9	. .	24 5 25.61	P.
16		Washington	8 32 13.96	.599	33.26	8 31 41.30	303 18 35.82	1 19.87	. .	. .	23 16 13.26	
17		Bessel . . . 278	8 47 59.22	.643	33.26	8 47 26.60	304 19 32.98	1 16.83	. .	. .	22 15 13.06	
18		Washington	9 8 47.93	+ .568	33.26	9 8 15.24	306 19 8.25	−1 11.39	. .	. .	+20 15 32.35	
19		ι Argus	9 13 43.07	− .541	33.26	9 13 9.27	25 12 40.85	+ 24.80	. .	. .	−58 39 36.44	
20		α Hydræ	9 20 52.38	+ .346	33.26	9 20 19.47	334 35 14.28	− 25.02	. .	. .	− 8 1 20.05	
21	27	Washington	8 20 22.76	.673	33.38	8 19 50.05	302 15 1.05	1 23.66	13.1	. .	+24 19 43.62	M.
22		Washington	8 30 44.80	.663	33.38	8 30 12.08	303 10 21.88	1 20.77	. .	. .	23 24 19.90	
23 e		Washington	8 32 13.70	.661	33.38	8 31 40.98	303 18 33.12	1 20.35	. .	. .	23 16 8.24	
24		Bessel . . . 278	8 46 31.21	.651	33.38	8 45 58.48	304 11 56.25	1 17.77	. .	. .	22 22 42.53	
25		Washington	9 8 47.67	.626	33.38	9 8 14.92	306 19 1.22	1 11.99	. .	. .	20 15 31.78	
26	29	H. C. 16393	8 15 18.11	.674	33.21	8 14 45.57	302 34 25.00	1 22.38	8.9	. .	24 0 22.59	M.
27		Washington	8 20 22.36	.679	33.21	8 19 49.83	302 15 6.70	1 23.42	. .	. .	24 19 41.93	
28		Washington	8 32 13.56	.720	33.21	8 31 41.07	303 18 33.62	1 20.16	. .	. .	23 16 11.75	
29		Washington	9 8 47.67	.627	33.21	9 8 15.09	306 19 4.32	1 11.78	. .	. .	20 15 32.67	
30	30	Bessel . . . 275	9 8 47.13	+ .664	32.97	9 8 14.82	306 42 26.05	−1 10.75	8.8	. .	+19 52 10.01	P.
31		ι Argus	9 13 42.79	− .621	32.97	9 13 9.20	25 12 38.72	+ 24.88	. .	. .	−58 39 38.29	
32		α Hydræ	9 20 52.09	+ .335	32.97	9 20 19.46	334 35 10.45	− 25.11	. .	. .	− 8 1 20.03	
33	31	H. C. 16464	8 17 8.57	.676	33.40	8 16 35.85	302 33 13.02	1 18.50	8.3	. .	+24 1 31.29	M.
34		Bessel . . . 275	9 8 47.44	.638	33.41	9 8 14.67	306 42 26.15	1 10.15	. .	. .	19 52 9.81	
35	April 2	Bessel . . . 278	8 48 5.98	.934	33.84	8 47 33.07	304 25 59.75	1 18.23	7.7	. .	22 8 44.89	M.
36		Bessel . . . 275	9 7 59.09	.897	33.85	9 7 26.14	306 43 8.02	1 11.88	. .	. .	19 51 30.27	
37	6	Washington	8 20 21.29	.532	35.15	8 19 46.67	302 25 6.00	1 23.28	8.2	. .	24 9 43.19	M.
38		Bessel . . . 278	8 48 7.30	.566	35.16	8 47 32.71	304 25 55.35	1 17.15	. .	. .	+22 8 47.71	
39		α Hydræ	9 20 54.07	.314	35.17	9 20 19.21	334 35 10.50	25.22	. .	. .	− 8 1 19.37	
40	8	Washington	8 20 24.91	.522	35.68	8 19 49 75	302 15 5.90	1 23.37	+ 8.0	. .	+24 19 43.58	M.
41		α Hydræ	9 20 54.66	+0.297	−35.69	9 20 19.27	334 35 11.20	− 25.13	. .	. .	− 8 1 19.96	

a Bessel 275, 4th wire, — 3.27 rev. = 1′ 31″.30.

a As there are two stars in the field differing in A. R. almost accurately 1s., it is supposed that the A. R. of the preceding was observed while the declination of the following one was measured. I have transposed the circle readings to make the results conform with the observations on pages 316 and 317.

J. M. G.

b Bessel 278, 4th wire, + 0.14 rev. = 1″.70.

c Bessel 278, 6th wire, + 5.13 rev. = 10′ 48″.72.

d Bessel 275, 4th wire, — 3.23 rev. = 1′ 30″.20.

e Washington, 6th wire, — 0.51 rev. = 8′ 11″.24.

* Mr. Phelps observed this star on only one wire. It is reduced on the supposition that it was B.

INFERIOR CONJUNCTION OF VENUS, 1850-51.

MERIDIAN CIRCLE OBSERVATIONS.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1850.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Oct. 19	α Scorpii . . .	16 20 31.90	+0.109	—18.025	16 20 13.98	352 39 21.05	—0 6.72	— 2.92	. .	—26 5 37.30	G.
2		α Tri. Aust. . .	16 33 8.44	.682	18.007	16 32 51.11	35 17 44.40	+ 36.88	. .	. .	68 44 44.25	
3		Venus . . N.L.	16 39 49.14	.113	17.997	16 39 31.25	353 3 53.68	— 6.34	. .	+ 14.4	26 30 24.71	
4	20	α Scorpii . . .	16 20 29.99	.129	16.164	16 20 13.96	352 39 22.90	— 6.72	5.18	. .	26 5 36.89	G.
5		α Tri. Aust. . .	16 33 6.47	.721	16.146	16 32 51.04	35 17 45.60	+ 36.92	. .	. .	68 44 43.23	
6		Venus . . N.L.	16 43 37.01	.131	16.131	16 43 21.01	353 13 25.30	— 6.20	. .	14.6	26 39 54.41	
7	21	α Scorpii . . .	16 20 28.07	.096	14.241	16 20 13.93	352 39 23.90	— 6.72	6.47	. .	26 5 36.60	G.
8		α Tri. Aust. . .	16 33 4.44	.721	14.224	16 32 50.94	35 17 45.62	+ 36.89	. .	. .	68 44 41.93	
9		Venus . . N.L.	16 47 22.63	.132	14.204	16 47 8.56	353 22 23.55	— 6.06	. .	14.8	26 48 51.71	
10a	22	α Tri. Aust. . .	16 33 2.93	.615	11.931	16 32 51.62	35 17 45.87	+ 37.26	6.57	. .	68 44 42.45	G.
11		Venus . . N.L.	16 51 6.10	.080	11.906	16 50 54.27	353 30 46.85	— 5.99	. .	14.9	26 57 15.08	
12	23	α Scorpii . . .	16 20 23.97	.177	10.130	16 20 14.02	352 39 24.12	— 6.75	6.52	. .	26 5 36.74	G.
13		α Tri. Aust. . .	16 33 0.97	.190	10.114	16 32 51.05	35 17 45.92	+ 37.07	. .	. .	68 44 42.36	
14		Venus . . N.L.	16 54 46.58	+ .176	10.085	16 54 36.67	353 38 39.00	— 5.83	. .	15.1	27 5 7.64	
15	24	α Scorpii . . .	16 20 22.07	— .067	8.098	16 20 13.90	352 39 19.95	— 6.78	2.75	. .	26 5 36.31	G.
16		α Tri. Aust. . .	16 32 59.86	.815	8.081	16 32 50.96	35 17 41.75	+ 37.22	. .	. .	68 44 42.11	
17		Venus . . N.L.	16 58 23.14	.068	8.045	16 58 15.02	353 45 54.17	— 5.75	. .	15.3	27 12 26.86	
18b	25	α Scorpii . . .	16 20 20.08	.080	6.129	16 20 13.87	352 39 19.30	— 6.71	3.08	. .	26 5 35.40	G.
19		α Tri. Aust. . .	16 32 57.77	.931	6.110	16 32 50.73	35 17 42.92	+ 36.81	. .	. .	68 44 42.54	
20		Venus . . N.L.	17 1 59.64	.093	6.066	17 1 53.48	353 52 36.75	— 5.58	. .	15.6	27 19 9.58	
21	26	α Scorpii . . .	16 20 17.76	.058	3.805	16 20 13.89	352 39 20.25	— 6.69	2.45	. .	26 5 37.00	G.
22		α Tri. Aust. . .	16 32 55.61	.886	3.784	16 32 50.94	35 17 42.82	+ 36.75	. .	. .	68 44 43.01	
23		Venus . . N.L.	17 5 31.36	.072	3.730	17 5 27.56	353 58 48.42	— 5.48	. .	15.9	27 25 22.28	
24	27	α Scorpii . . .	16 20 15.41	.101	1.483	16 20 13.83	352 39 22.65	— 6.79	4.60	. .	26 5 37.15	G.
25		α Tri. Aust. . .	16 32 53.64	1.416	1.462	16 32 50.76	35 17 41.72	+ 37.30	. .	. .	68 44 40.31	
26		Venus . . N.L.	17 8 59.47	.123	— 1.402	17 8 57.95	354 4 28.22	— 5.47	. .	16.2	27 31 0.24	
27	28	α Scorpii . . .	16 20 13.04	.135	+ 0.945	16 20 13.86	352 39 21.65	— 6.83	4.42	. .	26 5 36.29	G.
28		α Tri. Aust. . .	16 32 51.20	1.416	0.966	16 32 50.75	35 17 41.60	+ 37.47	. .	. .	68 44 40.54	
29		Venus . . N.L.	17 12 24.09	.124	1.033	17 12 24.89	354 9 35.68	— 5.42	. .	16.4	27 36 8.13	
30c	30	α Scorpii . . .	16 20 8.11	.079	5.807	16 20 13.84	352 39 21.57	— 6.79	— 4.60	. .	26 5 36.07	G.
31		α Tri. Aust. . .	16 32 46.37	1.371	5.830	16 32 50.83	35 17 41.35	+ 37.27	. .	. .	68 44 39.91	
32		Venus . . N.L.	17 19 2.66	—0.003	+ 5.956	17 19 8.62	354 18 8.00	—0 5.26	. .	+ 16.8	—27 44 40.83	

a Passing cirri prevented α Scorpii being seen.

b The screw moving the wires in collimation was turned last night to reduce the error.

c α Scorpii extremely unsteady.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declinatian.	Observer.
	1850.		h. m. s.	s.	s.	h. m. s.	° ′ ″	″	″	″	° ″ ″	
1	Oct. 31	α Scorpii . . .	16 20 5.39	—0.090	+ 8.659	16 20 13.96	352 39 22.60	— 6.67	— 5.32	. .	—26 5 36.50	G.
2		α Tri. Aust. . .	16 32 43.56	1.393	8.686	16 32 50.86	35 17 43.42	+ 36.61	. .	. .	68 44 40.60	
3a		Venus . . N.L.	17 22 15.60	.116	8.787	17 22 24.27	354 21 40.90	— 5.11	. .	+ 17.1	27 48 13.46	
4	Nov. 1	α Scorpii . . .	16 20 2.43	.130	11.738	16 20 14.04	352 39 22.45	— 6.69	4.35	. .	26 5 37.30	G.
5		α Tri. Aust. . .	16 32 40.91	1.755	11.665	16 32 50.82	35 17 45.20	+ 36.71	. .	. .	68 44 43.45	
6		η Ophiuchi . . .	17 1 36.00	+ .047	11.726	17 1 47.78	342 5 53.63	— 16.76	. .	. .	15 31 58.41	
7		Venus . . N.L.	17 25 23.94	— .163	11.776	17 25 35.56	354 24 41.15	5.08	. .	17.3	27 51 14.91	
8b	2	α Scorpii . . .	16 19 59.31	.160	14.698	16 20 13.85	352 39 25.68	— 6.69	8.89	. .	26 5 35.99	G.
9		α Tri. Aust. . .	16 32 38.23	2.230	14.725	16 32 50.73	35 17 46.18	+ 36.74	. .	. .	68 44 39.92	
10		β Aræ	17 12 38.05	1.162	14.810	17 12 51.70	. . . .	. .	. .	. .	. . . .	
11		Venus . . N.L.	17 28 27.67	.170	14.843	17 28 42.34	354 27 8.48	— 5.03	. .	+ 17.6	27 53 38.05	
12	4	α Tri. Aust. . .	16 32 32.21	2.246	20.847	16 32 50.81	35 17 45.50	+ 36.71	8.38	. .	68 44 39.72	P.
13		η Ophiuchi . . .	17 1 26.68	.045	20.906	17 1 47.54	342 5 57.28	— 16.86	. .	. .	15 31 57.93	
14		β Aræ	17 12 32.07	1.174	20.929	17 12 51.83	21 56 12.68	+ 21.02	. .	. .	55 22 51.21	
15		α Aræ	17 19 56.44	.961	20.944	17 20 16.42	. . . .	. .	. .	. .	. . . .	
16c		Venus . . S.L.	17 34 21.11	.272	20.973	17 34 41.81	354 31 10.75	— 5.01	. .	— 18.2	27 51 5.05	
17	5	α Scorpii . . .	16 19 50.21	.193	23.680	16 20 13.70	352 39 21.23	— 6.69	7.75	. .	26 5 32.68	G.
18		α Tri. Aust. . .	16 32 28.73	—1.860	23.704	16 32 50.57	35 17 43.03	+ 36.72	. .	. .	68 44 37.89	
19		η Ophiuchi . . .	17 1 23.25	+ .025	23.760	17 1 47.04	342 5 53.55	— 16.77	. .	. .	15 31 54.92	
20		Venus . . N.L.	17 37 9.84	— .195	23.828	17 37 33.47	354 31 23.40	4.97	. .	+ 18.5	27 57 55.07	
21	7	α Scorpii . . .	16 19 44.96	.076	28.919	16 20 13.80	352 39 22.23	— 6.70	5.68	. .	26 5 35.74	G.
22		α Tri. Aust. . .	16 32 23.33	—1.692	28.941	16 32 50.58	35 17 41.95	+ 36.79	. .	. .	68 44 38.95	
23		η Ophiuchi . . .	17 1 18.46	+ .099	28.991	17 1 47.55	342 5 52.68	— 16.79	. .	. .	15 31 56.10	
24		Venus . . N.L.	17 42 31.89	— .110	+29.062	17 43 0.84	354 31 44.93	4.98	. .	19.0	27 58 19.16	
25	*8	α Scorpii . . .	16 20 44.10	.065	—30.047	16 20 13.99	352 39 22.53	— 6.72	6.05	. .	26 5 35.65	G.
26		α Tri. Aust. . .	16 33 22.46	—1.669	30.052	16 32 50.74	35 17 40.88	+ 36.92	. .	. .	68 44 37.64	
27		η Ophiuchi . . .	17 2 17.71	+ .109	30.065	17 1 47.75	342 5 57.28	— 16.85	. .	. .	15 32 0.27	
28		Venus . . N.L.	17 46 5.69	— .099	30.084	17 45 35.51	354 31 11.68	5.00	. .	19.3	27 57 45.82	
29d	10	α Scorpii . . .	16 20 45.16	.120	31.452	16 20 13.59	352 39 24.65	— 6.78	7.73	. .	26 5 36.03	G.
30		α Tri. Aust. . .	16 33 24.09	—1.564	31.456	16 32 51.07	35 17 40.15	+ 37.25	. .	. .	68 44 35.56	
31		η Ophiuchi . . .	17 2 18.94	+ .036	31.466	17 1 47.51	342 5 55.18	— 17.01	. .	. .	15 31 56.33	
32		Venus . . N.L.	17 50 56.94	— .150	31.482	17 50 25.31	354 28 36.78	5.09	. .	20.0	27 55 9.85	
33		μ′ Sagittarii . .	18 5 20.29	— .076	31.487	18 4 46.73	347 39 22.70	11.52	. .	. .	21 5 29.34	
34e	11	η Ophiuchi . . .	17 2 19.29	+ .063	31.945	17 1 47.40	342 5 54.95	— 16.87	7.48	. .	15 31 56.49	G.
35		α Aræ	17 20 48.86	— .643	31.936	17 20 16.28	16 18 26.08	+ 15.28	. .	. .	—49 44 59.77	
36		α Ophiuchi . . .	17 28 30.26	+ .492	31.933	17 27 58.82	313 54 1.88	— 54.22	. .	. .	+12 40 33.93	
37		Venus . . N.L.	17 53 12.21	— .140	31.922	17 52 40.15	354 26 37.23	5.08	. .	20.3	—27 53 10.86	
38f	13	α Scorpii . . .	16 20 44.54	.066	30.687	16 20 13.79	352 39 25.73	— 6.75	10.05	. .	26 5 34.82	G.
39		α Tri. Aust. . .	16 33 23.67	2.958	30.680	16 32 50.03	35 17 41.60	+ 37.10	. .	. .	68 44 34.54	
40		α Aræ	17 20 48.02	1.019	30.652	16 20 16.35	16 18 26.95	+ 15.34	. .	. .	49 44 58.13	
41		Venus . . N.L.	17 57 18.57	.087	30.632	17 56 47.85	354 21 9.33	— 5.18	. .	+ 21.0	27 47 40.99	
42	14	α Scorpii . . .	16 20 43.83	.114	29.736	16 20 13.98	352 39 26.20	— 6.53	—11.88	. .	26 5 33.68	G.
43		α Tri. Aust. . .	16 33 22.41	—2.148	29.726	16 32 50.54	35 17 45.58	+ 35.88	. .	. .	68 44 35.47	
44		η Ophiuchi . . .	17 2 17.01	+0.105	—29.705	17 1 47.41	342 5 57.38	— 16.38	. .	. .	—15 31 55.01	

a This is the best observation yet made of the planet.

b Light cirri over all the heavens.

c Recorded N.L., but the discordance with ephemeris induces me to believe the S.L. was really observed, and it is reduced accordingly. J. M. G.

d α Scorpii was exceedingly unsteady. α Aræ was seen but too dimly to measure; it certainly is not so bright as β. α Ophiuchi obscured by clouds, through which Venus also was seen. Wires D, F, G of μ^1 Sagittarii occulted by horizontal wire.

e α Scorpii and α Trianguli Australis not seen by reason of clouds.

f The observations of α Scorpii and α Trianguli Australis are not reliable in declination, both objects being rather like flaring mops than stars, and very unsteady.

* At 2*h*. 20*m*. shortened clock pendulum and advanced hand one minute.

DECEMBER 22, 1849—Continued.

Remarks.

a Mars blazing and unsteady.
b Good observations.
c Seen through haze.
d Good measures.
e Objects unsteady; recorded 56.5*s*. at wire A.
f Mars blazing and very unsteady during the remainder of the observations, the temperature of the air and dew-point falling rapidly.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Twelve transits . . .	5 9 54.50	+ 5 34.439	—0.322	=0 6.28
Mean S. F. . .	Twelve transits . . .	5 17 48.63	+ 5 35.476	—1.361	=0 26.53

	h. m.	s.		h. m. s.
Correction for chronometer at	5 10	—12.53	Santiago sid. time N. P.	5 9 41.97
Correction for chronometer at	5 18	—12.54	Santiago sid. time S. F.	5 17 36.09
			Interval	7 54.12

	″		″
Δ P F. limbs in A. R. reduced to arc . . .	15.55	Δ N. S. limbs micr. in rev.	1.039=20.25
Variation of A. R. in 7*m*. 54*s*.	+ 8.23	Variation of declination in 7*m*. 54*s*. . .	+ 0.11
Observed P. F. diameter	23.78	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	18.16

h. m.	″	h. m.	″
Δ ρ at 5 7	0.01	Δ ρ at 5 15	0.03

DECEMBER 23, 1849.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ *a*.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	405	29.2	42.3	55.5	9.0	21.8	3 6 55.56	+5.32			28.186	67.7	56.5
2	Mars . . .	N.P.	32.5	45.8	59.0	12.6	25.1	3 10 59.00	5.86	+4 3.44	+0.54			
3	Bessel . . .	405	2.5	16.0	29.0	42.5	55.1	3 13 29.02	5.86			Ther. att. 65°.6 Bar. red. to 32° F. 28.087		
4	Mars . . .	S.F.	6.5	20.1	33.5	47.0	49.8	3 17 33.38	5.19	4 4.36	—0.67			
5	Bessel . . .	405	21.5	34.8	47.2	1.0	14.0	3 21 47.70	2.97					
6	Mars . .	N.P.	23.2	36.6	50.1	3.5	15.6	3 25 49.80	3.45	4 2.10	+0.48			
7	Bessel . . .	405	34.5	47.8	1.0	14.3	26.8	3 28 0.88	3.13					
8	Mars . . .	S.F.	36.8	51.0	4.0	17.7	30.5	3 32 4.00	2.50	4 3.12	—0.63			
9	Bessel . . .	405	53.2	6.5	19.5	33.0	46.0	3 34 19.64	3.67					
10	Mars . . .	N.P.	54.8	8.1	21.3	34.5	47.3	3 38 21.20	4.14	4 1.56	+0.47			
11	Bessel . . .	405	24.1	37.5	50.6	4.0	16.8	3 42 50.60	4.37					
12	Mars . . .	S.F.	26.5	39.5	52.8	6.1	18.8	3 46 52.74	3.78	4 2.14	—0.59			
13	Bessel . . .	405	33.3	46.5	59.7	13.0	25.5	3 48 59.60	4.56					
14	Mars . . .	N.P.	34.5	47.0	0.0	13.4	26.0	3 53 0.18	4.96	4 0.58	+0.40			
15	Bessel . . .	405	36.5	49.8	3.0	16.5	29.0	3 55 2.96	4.87					
16	Mars . . .	S.F.	37.8	51.0	4.3	17.5	30.8	3 59 4.28	4.31	4 1.32	—0.56			
17	Bessel . . .	405	30.8	44.3	57.5	10.8	23.5	4 0 57.38	5.07					
18	Mars . . .	N.P.	30.3	43.5	57.0	10.3	23.0	4 4 56.82	5.53	3 59.44	+0.46			
19	Bessel . . .	405	38.8	52.0	5.5	19.0	31.5	4 7 5.36	5.37					
20	Mars . . .	S.F.	39.5	52.8	5.8	19.3	32.0	4 11 5.88	4.81	4 0.52	—0.56			
21	Bessel . . .	405	57.5	10.6	24.0	37.3	50.0	4 13 23.88	5.51					
22	Mars . . .	N.P.	56.0	9.3	22.5	36.0	48.7	4 17 22.50	6.05	3 58.62	+0.54			
23	Bessel . . .	405	37.7	51.0	4.5	17.5	30.3	4 19 4.20	5.65					
24	Mars . . .	S.F.	37.5	51.0	4.5	17.5	30.3	4 23 4.16	5.18	3 59.96	—0.47			
25	Bessel . . .	405	43.0	56.2	9.5	22.5	35.5	4 27 9.34	6.00					
26	Mars . . .	N.P.	41.0	54.2	7.2	20.5	33.5	4 31 7.28	6.43	3 57.94	+0.43			
27	Bessel . . .	405	13.8	27.0	40.2	53.5	6.0	4 32 40.10	6.16					
28	Mars . . .	S.F.	12.3	25.5	38.7	52.0	5.0	4 36 38.70	+5.71	+3 58.60	—0.45			

DECEMBER 23, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
29	Bessel . . . 405	52.0	5.1	18.3	31.5	44.3	4 38 18.24	+6.41			28.186	67.7	56.5
30	Mars . . . N.P.	. .	2.0	15.0	28.5	41.2	4 41 15.05	6.86	+3 56.81	+0.45			
31	Bessel . . . 405	59.6	12.6	25.9	39.2	52.0	4 44 25.86	6.59			Ther. att. 65°.6		
32 *a*	Mars . . . S.F.	57.3	10.5	23.5	37.0	49.8	4 48 23.62	6.09	3 57.76	—0.50	Bar. red. to 32° F. 28.087		
33	Bessel . . . 405	38.5	51.8	4.8	18.3	31.0	4 50 4.88	6.76					
34	Mars . . . N.P.	34.5	47.7	1.0	14.3	27.0	4 54 0.90	7.23	3 56.02	+0.47			
35	Bessel . . . 405	25.5	39.0	52.5	6.0	18.5	4 55 52.30	7.01					
36 *b*	Mars . . . S.F.	. .	. .	49.5	2.5	15.5	4 59 49.29	6.52	3 56.99	—0.49			
37	Bessel . . . 405	8.5	21.8	35.0	48.0	1.0	5 2 34.86	7.16					
38	Mars . . . N.P.	3.5	16.8	30.0	43.5	56.2	5 6 30.00	7.59	3 55 14	+0.43			
39	Bessel . . . 405	39.1	52.5	5.7	19.2	32.0	5 8 5.70	7.29					
40	Mars . . . S.F.	34.8	48.5	1.7	15.0	28.0	5 12 1.60	6.81	3 55.90	—0.48			
41 *c*	Bessel . . . 405	21.0	34.5	47.3	0.8	13.5	5 13 47.42	7.51					
42	Mars . . . N.P.	15.2	28.0	41.2	55.5	8.0	5 17 41.58	7.98	3 54.16	+0.47			
43	Bessel . . . 405	40.5	53.7	7.1	20.3	33.2	5 21 6.96	3.95					
44	Mars . . . S.F.	35.5	48.7	2.0	15.5	28.2	5 25 1.98	3.42	3 55.02	—0.53			
45	Bessel . . . 405	38.0	51.2	4.5	18.0	30.7	5 27 4.48	4.08					
46	Mars . . . N.P.	31.0	44.5	57.7	11.5	24.0	5 30 57.74	4.49	3 53.26	+0.41			
47	Bessel . . . 405	12.0	25.0	38.3	51.8	4.5	5 33 38.32	4.17					
48	Mars . . . S.F.	5.5	19.5	32.5	46.0	58.2	5 37 32.34	3.70	3 54.02	—0 47			
49 *d*	Bessel . . . 405	11.5	24.5	37.8	51.2	4.0	5 40 37.80	4.31					
50	Mars . . . N.P.	3.3	16.7	30.3	43.8	56.5	5 44 30 12	4.81	3 52.32	+0.50			
51	Bessel . . . 405	45.2	58.6	11.7	25.3	38.0	5 47 11.76	4.54					
52	Mars . . . S.F.	38.5	52.0	5.0	18.5	31.0	5 51 5.00	3.98	3 53.24	—0.56			
53	Bessel . . . 405	15.3	28.6	41.7	55.3	8.0	5 52 41.78	4.50					
54	Mars . . . N.P.	7.1	20.2	33.5	46.8	59.3	5 56 33.38	5.04	3 51.60	+0.46			
55	Bessel . . . 405	35.5	48.5	1.8	15.2	28.0	5 58 1.80	4.61					
56	Mars . . . S.F.	27.8	41.0	54.3	7.8	20.4	6 1 54.26	4.18	3 52.46	—0.43			
57	Bessel . . . 405	30.5	44.0	57.2	10.5	23.3	6 4 57.10	4.59					
58	Mars . . . N.P.	21.2	34.6	47.8	1.2	13.9	6 8 47.74	5.14	3 50.64	+0.55			
59	Bessel . . . 405	52.6	6.0	19.2	32.5	45.3	6 10 19.12	4.69					
60	Mars . . . S.F.	44.2	57.5	10.8	24.0	36.8	6 14 10.66	+4.25	+3 51.54	—0.44			

Remarks.

As the image of Mars was very flaring, and its motion extremely irregular, it was impossible to measure with much certainty until 4*h*. 45*m*.

a Planet Mars steady. *b* Both excellent measures. *c* Recorded 8.0*s*. at wire D. *d* Recorded 40.0*s*. at wire E.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Fifteen transits . . .	4 41 27.55	+3 56.909	—0.471	= 0 9.18
Mean S. F. . .	Fifteen transits . . .	4 47 45.46	+3 57.797	+0.522	= 0 10.17

	h. m. s.
Correction for chronometer at 4 41	—13.26
Correction for chronometer at 4 48	—13.26

	h. m. s.
Santiago sid. time N. P.	4 41 14.29
Santiago sid. time S. F.	4 47 32.20
Interval	6 17.91

	″
Δ P. F. limbs in A. R. reduced to arc . . .	13.32
Variation of A. R. in 6*m*. 18*s*.	+ 6.47
Observed P. F. diameter	19.79
Δ ρ at 4h. 39m.	0.01

	″
Δ N. S. limbs micr. in rev.	0.994 = 19.35
Variation of declination in 6*m*. 18*s*. . .	+ 0.06
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	17.21
Δ ρ at 4h. 46m.	0.01

DECEMBER 24, 1849.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 405	21.3	35.0	48.5	. .	14.5	3 14 48.18	+3.75			28.193	71.1	57.8
2	Mars . . . N.P.	48.0	1.5	14.5	28.0	40.8	3 17 14.56	4.74	+2 26.38	+0.99			
3	Bessel . . . 405	13.5	27.8	41.0	54.5	7.0	3 19 40.76	4.01			Ther. att. 70°.2		
4	Mars . . . S.F.	40.0	53.5	6.7	20.2	33.5	3 22 6.78	3.91	2 26.02	—0.10	Bar. red. to 32° F.		
5	Bessel . . . 405	27.0	40.2	53.2	6.8	19.5	3 29 53.34	4.40			28.080		
6	Mars . . . N.P.	51.2	4.5	17.5	31.0	43.6	3 32 17.56	5.33	2 24.22	+0.93			
7	Bessel . . . 405	36.5	49.8	3.0	16.3	29.0	3 34 2.92	4.61					
8	Mars . . . S.F.	1.5	15.0	28.2	41.5	54.7	3 36 28.18	4.45	2 25.26	—0.16			
9	Bessel . . . 405	17.7	31.2	44.0	57.0	9.7	3 38 43.92	4.78					
10	Mars . . . N.P.	41.0	54.3	7.5	21.0	33.7	3 41 7.50	5.75	2 23.58	+0.97			
11	Bessel . . . 405	39.0	52.2	5.3	18.7	31.5	3 43 5.34	5.02					
12	Mars . . . S.F.	. .	16.8	29.8	43.3	56.0	3 45 29.85	4.92	2 24.51	—0.10			
13	Bessel . . . 405	26.5	39.8	52.8	6.0	18.7	3 47 52.76	5.19					
14	Mars . . . N.P.	49.3	2.5	15.6	29.0	41.8	3 50 15.61	6.08	2 22.88	+0.89			
15	Bessel . . . 405	55.1	8.2	21.3	34.5	47.5	3 52 21.32	5.35					
16	Mars . . . S.F.	18.8	32.0	45.3	58.7	11.5	3 54 45.26	5.28	2 23.94	—0.07			
17 a	Bessel . . . 405	17.3	30.5	43.7	57.0	10.5	3 57 43.30	5.63					
18	Mars . . . N.P.	39.6	52.6	5.7	19.3	32.0	4 0 5.84	6.52	2 22.04	+0.89			
19	Bessel . . . 405	0.5	13.5	26.8	40.3	52.5	4 10 26.72	2.99					
20	Mars . . . S.F.	23.0	36.2	49.2	2.7	15.0	4 12 49.22	2.89	2 22.50	—0.10			
21	Bessel . . . 405	39.8	52.5	5.5	18.5	31.5	4 15 5.56	3.76					
22	Mars . . . N.P.	0.5	14.0	27.0	40.5	53.0	4 17 27.00	4.76	2 21.44	+1.00			
23	Bessel . . . 405	27.0	40.5	53.7	6.8	19.5	4 19 53.50	4.90					
24	Mars . . . S.F.	. .	1.0	14.0	27.5	40.2	4 22 14.05	4.80	2 20.55	—0.10			
25	Bessel . . . 405	46.9	0.2	13.3	26.5	39.3	4 24 13.24	4.13					
26	Mars . . . N.P.	7.2	20.4	33.5	46.8	59.5	4 26 33.48	5.09	2 20.24	+0.96			
27	Bessel . . . 405	3.0	16.2	29.2	42.5	55.5	4 28 29.28	4.28					
28	Mars . . . S.F.	24.0	37.2	50.5	4.0	16.5	4 30 50.44	4.22	2 21.16	—0.06			
29	Bessel . . 405	52.2	5.5	18.5	32.0	44.8	4 32 18.60	4.43					
30	Mars . . . N.P.	. .	25.2	38.2	51.8	4.5	4 34 38.30	5.38	2 19.70	+0.95			
31	Bessel . . . 405	2.5	15.8	29.0	42.5	55.3	4 36 29.02	4.62					
32	Mars . . S.F.	23.4	36.5	49.6	3.0	15.7	4 38 49.64	4.52	2 20.62	—0.10			
33	Bessel . . . 405	5.5	18.7	31.7	45.0	57.8	4 40 31.74	4.71					
34	Mars . . . N.P.	. .	37.5	50.8	4.2	17.0	4 42 50.75	5.60	2 19.01	+0.89			
35	Bessel . . . 405	30.8	43.8	57.0	10.5	23.2	4 44 57.06	4.89					
36	Mars . . . S.F.	50.5	4.0	17.0	30.5	43.2	4 47 17.04	4.80	2 19.98	—0.09			
37	Bessel . . . 405	12.0	25.2	38.2	51.5	4.3	4 52 33.24	5.15					
38	Mars . . N.P.	30.2	43.2	56.5	9.8	22.5	4 54 56.44	6.06	2 18.20	+0.91			
39	Bessel . . . 405	29.0	42.5	56.0	9.0	22.0	4 56 55.70	5.36					
40	Mars . . . S.F.	48.3	1.5	14.7	28.3	41.0	4 59 14.76	5.28	2 19.06	—0.08			
41	Bessel . . . 405	17.5	30.6	43.6	. .	10.0	5 2 43.78	5.55					
42	Mars . . . N.P.	34.5	48.2	1.4	14.5	27.3	5 5 1.18	6.45	2 17.40	+0.90			
43	Bessel . . . 405	56.8	10.2	23.2	36.7	49.5	5 7 23.28	5.57					
44	Mars . . . S.F.	15.3	28.5	41.5	55.0	8.0	5 9 41.66	5.51	2.18.38	—0.06			
45	Bessel . . . 405	15.5	28.5	41.7	55.7	8.0	5 11 41.88	5.80					
46	Mars . . . N.P.	32.5	45.5	58.7	12.2	25.0	5 13 58.78	+6.66	+2 16.90	+0.86			

DECEMBER 24, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 405	17.5	30.5	43.6	57.2	10.0	5 18 43.76	+6.04			28.193	71.1	57.8
48	Mars . . . S.F.	35.2	48.5	1.5	15.0	27.8	5 21 1.60	5.99	+2 17.84	—0.05			
49	Bessel . . . 405	48.8	2.0	15.3	28.5	41.2	5 23 15.16	6.14			Ther. att. 70°.2		
50	Mars . . . N.P.	5.0	18.0	31.2	44.5	57.2	5 25 31.18	7.13	2.16.02	+0.99	Bar. red. to 32° F.		
51	Bessel . . . 405	6.8	20.1	33.2	46.8	59.2	5 27 33.22	6.26			28.080		
52	Mars . . . S.F.	. .	37.2	50.5	3.5	16.4	5 29 50.28	6.19	2 17.06	—0.07			
53	Bessel . . . 405	51.8	5.0	18.2	31.7	44.5	5 32 18.24	6.27					
54	Mars . . . N.P.	7.2	20.5	33.5	47.0	59.7	5 34 33.58	7.20	2 15.34	+0.93			
55	Bessel . . . 405	36.3	49.2	2.5	16.0	28.7	5 41 2.54	6.47					
56	Mars . . . S.F.	52.1	5.2	18.5	32.0	44.8	5 43 18.52	6.38	2 15.98	—0.09			
57	Bessel . . . 405	37.0	50.1	3.3	16.5	29.3	5 45 3.24	6.52					
58	Mars . . . N.P.	51.0	4.5	17.7	31.1	43.7	5 47 17.60	7.43	2 14.36	+0.91			
59	Bessel . . . 405	2.3	15.5	29.0	42.3	55.0	5 49 28.82	6.68					
60	Mars . . . S.F.	18.0	31.1	44.5	57.7	10.5	5 51 44.36	6.59	2 15.54	—0.09			
61	Bessel . . . 405	13.3	26.5	39.7	53.2	6.0	5 53 39.74	6.82					
62	Mars . . . N.P.	27.3	40.5	53.7	7.0	20.0	5 55 53.75	7.79	2 14.01	+0.97			
63	Bessel . . . 405	52.0	5 2	18.2	31.6	44.6	5 58 18.32	6.99					
64	Mars . . . S.F.	6.8	20.0	33.4	46.8	59.5	6 0 33.30	6.95	2 14.98	—0.04			
65	Bessel . . . 405	41.2	54.5	7.5	20.6	33.8	6 3 7.52	6.99					
66	Mars . . . N.P.	54.5	7.5	20.6	34.2	47.0	6 5 20.76	7.98	2 13.24	+0.99			
67	Bessel . . . 405	10.0	23.2	36.3	49.8	2.5	6 8 36.36	7.87					
68	Mars . . . S.F.	24.3	37.5	50.5	4.2	16.9	6 10 50.68	7.77	2 14.32	—0.10			
69	Bessel . . . 405	20.5	34.0	47.5	0.6	13.5	6 12 47.22	7.93					
70 b	Mars . . . N.P.	33.5	46.8	59.5	13.0	25.8	6 14 59.72	8.87	2 12.50	+0.94			
71	Bessel . . . 405	10.0	23.0	36.5	50.0	2.8	6 17 36.46	0.97					
72	Mars . . . S.F.	23.5	37.0	50.2	3.5	16.5	6 19 50.14	0.82	2 13.68	—0.15			
73	Bessel . . . 405	42.3	55.6	9.0	22.0	35.0	6 24 8.78	0.93					
74	Mars . . . N.P.	52.4	7.8	20.8	34.2	47.0	6 26 20.84	1.92	2 12.06	+0.99			
75	Bessel . . . 405	19.1	32.5	45.0	58.5	11.5	6 28 45.32	0.98					
76	Mars . . . S.F.	31.7	45.0	58.1	11.5	24.3	6 30 58.12	0.93	2 12.80	—0.05			
77	Bessel . . . 405	41.5	54.5	8.0	21.0	34.0	6 33 7.80	0.98					
78	Mars . . . N.P.	52.5	5.8	18.8	32.3	45.0	6 35 18.88	1.97	2 11.08	+0.99			
79	Bessel . . . 405	24.5	37.5	50.5	4.0	17.0	6 37 50.70	0.78					
80	Mars . . . S.F.	36.5	49.8	3.0	16.0	29.0	6 40 2.86	+0.71	+2 12.16	—0.07			

Remarks.

The observations of to-night are very generally good, both objects being well defined and moderately steady throughout the whole period. There has been considerable change in the physical appearance of the planet since the 17th, the dark-red and greenish white portions being of a less decided distinctness. So clear and unvarying is the atmosphere, that there appears no limit to the magnifying power which may be applied.

a Recorded 14.5*s*. at wire E.

b Micrometer recorded + 7.87 rev.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Twenty transits . . .	4 59 5.17	+2 18.030 . . .	+0.942	=0 18.36
Mean S. F. . .	Twenty transits . . .	5 4 23.84	+2 18.817 . . .	—0.086	=0 1.68

DECEMBER 24, 1849—Continued.

Results—Continued.

	h. m.	s.
Correction for chronometer at	4 59	—13.93
Correction for chronometer at	5 4	—13.93

	h. m. s.
Santiago sid. time N. P.	4 58 51.24
Santiago sid. time S. F.	5 4 9.91
Interval	5 18.67

	″
Δ P. F. limbs in A. R. reduced to arc	11.80
Variation of A. R. in 5*m*. 19*s*.	+ 5.36
Observed P. F. diameter	17.16

		″
Δ N. S. limbs micr. in rev.	1.028 =	20.04
Variation of declination in 5*m*. 19*s*.		+ 0.02
Corr. for diam. of micr. wires		— 2.20
Observed N. S. diameter		17.86

	h. m.	″
Δ ρ at	4 58	0.03
Δ ρ at	5 3	0.00

DECEMBER 25, 1849.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ *α*.	Δ *δ*.		Air.	Wet
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel	405	3.5	17.2	30.1	43.5	. .	3 39 30.13	+3.22			28.023	73.2	57.8
2	Mars	N.P.	. .	4.5	17.8	31.0	43.8	3 40 17.65	4.25	+47.52	+1.03			
3	Bessel	405	24.9	38.0	51.3	4.6	. .	3 42 51.25	3.42			Ther. att. 72.2°		
4	Mars	S.F.	13.4	26.5	39.5	53.2	6.0	3 43 39.72	3.40	48.47	—0.02	Bar. red. to 32° F. 27.904		
5	Bessel	405	30.7	44.0	57.2	10.5	. .	3 45 57.15	3.59					
6	Mars	N.P.	17.7	31.0	44.2	57.7	10.5	3 46 44.22	4.49	47.07	+0.90			
7	Bessel	405	16.5	30.0	43.0	56.5	. .	3 48 43.05	3.74					
8	Mars	S.F.	5.0	18.0	31.0	44.5	57.2	3 49 31.14	3.73	48.09	—0.01			
9	Bessel	405	38.1	51.5	4.5	17.5	. .	3 50 4.45	3.79					
10	Mars	N.P.	24.8	38.0	51.2	4.5	17.7	3 50 51.22	4.78	46.77	+0.99			
11	Bessel	405	7.5	20.5	33.8	47.0	. .	3 53 33.75	3.98					
12	Mars	S.F.	55.0	8.5	21.5	35.0	47.5	3 54 21.50	3.93	47.75	—0.05			
13	Bessel	405	53.5	7.0	20.0	33.5	. .	3 55 20.05	4.02					
14	Mars	N.P.	40.0	53.5	6.5	20.2	32.8	3 56 6.60	5.00	46.54	+0.98			
15	Bessel	405	6.8	20.0	33.2	46.5	. .	4 0 33.18	4.21					
16	Mars	S.F.	54.0	7.5	20.5	34.0	46.8	4 1 20.56	4.16	47.38	—0.05			
17	Bessel	405	57.0	. .	23.2	37.0	. .	4 2 23.48	4.18					
18	Mars	N.P.	. .	56.2	9.0	22.5	35.5	4 3 9.18	5.26	45.70	+1.08			
19 *a*	Bessel	405	47.5	0.2	13.2	26.5	. .	4 15 13.40	1.30					
20	Mars	S.F.	. .	46.2	59.5	12.8	25.5	4 16 59.38	1.29	45.98	—0.01			
21 *b*	Bessel	405	51.0	4.3	17.5	30.7	. .	4 18 17.43	1.41					
22	Mars	N.P.	. .	49.2	2.3	15.5	28.4	4 19 2.23	2.26	44.80	+0.85			
23	Bessel	405	16.3	29.5	42.3	56.2	. .	4 28 42.63	1.30					
24	Mars	S.F.	. .	14.3	28.0	41.5	54.2	4 29 27.90	1.34	45.27	0.04			
25	Bessel	405	7.0	20.5	33.3	. .	. .	4 31 33.48	1.34					
26	Mars	N.P.	51.2	4.3	17.3	31.0	43.5	4 32 17.46	2.35	43.98	1.01			
27	Bessel	405	42.5	55.5	8.9	21.5	. .	4 33 8.65	1.50					
28	Mars	S.F.	. .	40.8	54.0	7.2	20.0	4 33 53.88	1.50	45.23	±0.00			
29	Bessel	405	3.5	16.5	29.5	. .	. .	4 37 29.71	1.64					
30	Mars	N.P.	. .	0.2	13.5	26.7	39.3	4 38 13.30	2.52	43.59	+0.88			
31	Bessel	405	42.8	55.8	9.5	22.8	. .	4 39 9.28	1.69					
32	Mars	S.F.	. .	40.1	53.3	6.8	19.3	4 39 53.25	+1.63	+43.97	—0.06			

DECEMBER 25, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
33	Bessel . . . 405	18.5	31.5	44.8	58.0	. .	4 42 44.75	+1.68			28.023	73.2	57.8
34	Mars . . . N.P.	. .	14.5	27.5	41.0	54.3	4 43 27.70	2.62	+42.95	+0.94			
35	Bessel . . . 405	12.0	25.2	38.5	52.0	. .	4 45 38.73	1.81			Ther. att. 72°.2		
36	Mars . . . S.F.	. .	9.2	22.2	36.0	48.5	4 46 22.35	1.77	43.62	—0.04	Bar. red. to 32° F.		
37	Bessel . . . 405	52.0	5.0	18.3	31.5	. .	4 47 18.25	1.87			27.904		
38	Mars . . . N.P.	. .	47.6	1.0	13.5	26.7	4 49 0.58	2.83	42.33	+0.96			
39	Bessel . . . 405	16.5	29.8	43.0	56.5	. .	4 50 43.00	1.98					
40	Mars . . . S.F.	. .	13.2	26.8	40.2	53.0	4 51 26.68	1.89	43.68	—0.09			
41	Bessel . . . 405	13.5	26.5	40.0	53.0	. .	4 53 39.80	1.98					
42	Mars . . . S.F.	. .	10.2	23.5	37.0	49.6	4 54 23.45	1.92	43.65	—0.06			
43	Bessel . . . 405	10.0	23.0	36.2	49.8	. .	5 0 36.30	2.06					
44	Mars . . . S F.	. .	6.3	19.5	32.5	45.7	5 1 19.38	2.08	43.08	+0.02			
45	Bessel . . . 405	52.5	6.0	19.0	32.5	. .	5 2 19.05	2.20					
46	Mars . . . N.P.	. .	47.5	0.8	14.2	26.8	5 3 0.70	3.11	41.65	0.91			
47	Bessel . . . 405	54.5	7.8	21.0	. .	. .	5 13 20.98	2.39					
48	Mars . . . S.F.	. .	49.7	3.2	16.8	29.3	5 14 3.13	2.45	42.15	0.06			
49	Bessel . . . 405	4.7	18.0	31.2	44.5	. .	5 16 31.15	2.45					
50 c	Mars . . . S.F.	. .	0.5	13.2	25.5	38.2	5 17 12.73	2.47	41.58	+0.02			
51	Bessel . . . 405	42.0	55.2	8.3	21.5	. .	5 18 8.30	2.57					
52	Mars . . . S.F.	. .	37.2	50.2	3.5	16.3	5 18 50.18	2.54	41.88	—0.03			
53	Bessel . . . 405	0.0	13.3	26.5	40.0	. .	5 21 26.50	2.56					
54 d	Mars . . . S.P.	. .	53.5	6.5	20.0	33.0	5 22 6.63	2.57	40.13	+0.01			
55	Bessel . . . 405	13.7	26.5	39.5	53.5	. .	5 26 39.85	2.74					
56	Mars . . . S.F.	. .	8.3	21.5	34.7	47.5	5 27 21.38	2.71	41.53	—0.03			
57	Bessel . . . 405	52.0	5.5	18.5	32.1	. .	5 28 18.58	2.72					
58	Mars . . . S.F.	. .	46.2	59.7	13.0	25.8	5 29 59.55	2.71	40.97	—0.01			
59 e	Bessel . . . 405	34.5	47.5	1.0	14.5	. .	5 32 0.88	2.75					
60	Mars . . . N.P.	. .	27.5	40.5	54.2	6.5	5 32 40.55	3.75	40.07	+1.00			
61	Bessel . . . 405	15.5	29.3	42.5	56.5	. .	5 34 42.50	2.81					
62	Mars . . . N.P.	. .	9.5	22.5	35.9	48.6	5 35 22.50	3.82	40.00	+1.01			
63	Bessel . . . 405	40.5	53.5	7.0	20.5	. .	5 36 6.93	2.98					
64	Mars . . . S.F.	. .	34.5	47.5	1.0	13.6	5 36 47.53	2.91	40.60	—0.07			
65	Bessel . . . 405	51.0	4.3	17.5	31.0	. .	5 39 17.50	2.87					
66	Mars . . . N.P.	. .	43.5	56.5	10.2	22.5	5 39 56.55	3.88	39.05	+1.01			
67	Bessel . . . 405	42.5	55.5	9.0	22.0	. .	5 41 8.80	3.07					
68	Mars . . S.F.	. .	36.8	49.0	2.5	15.5	5 41 49.30	3.04	40.50	—0.03			
69	Bessel . . . 405	2.5	16.0	29.5	42.8	. .	5 45 29.45	3.78					
70	Mars . . . N.P.	. .	55.2	8.2	21.5	34.2	5 46 8.15	4.71	38.70	+0.93			
71	Bessel . . 405	0.5	13.6	26.7	. .	. .	5 50 26.81	3.46					
72	Mars . . . S.F.	. .	53.5	. .	20.0	32.5	5 51 6.52	3.44	39.71	—0.02			
73	Bessel . . . 405	26.5	40.0	53.2	6.5	. .	5 52 53.10	3.51					
74	Mars . . . N.P.	. .	18.2	31.2	44.5	57.3	5 53 31.18	4.45	38.08	+0.94			
75	Bessel . . . 405	0.2	13.5	26.8	40.2	. .	5 55 26.73	3.56					
76	Mars . . . S.F.	. .	52.8	6.0	19.5	32.3	5 56 6.03	3.53	39.30	—0.03			
77	Bessel . . . 405	18.0	31.0	44.3	57.5	. .	5 57 44.25	3.73					
78	Mars . . . N.P.	. .	9.2	22.0	35.5	48.3	5 58 22.13	+4.66	+37.88	+0.93			

DECEMBER 25, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
79	Bessel . . . 405	37.5	51.0	4.3	17.8	. .	6 0 4.20	+3.69					
80	Mars . . . S.F.	. .	30.0	43.5	56.8	9.5	6 0 43.33	3.67	+39.13	—0.02	28.023	73.2	57.8
81	Bessel . . . 405	8.5	21.5	34.8	48.2	. .	6 2 34.80	3.60			Ther. att. 72°.2		
82	Mars . . . N.P.	. .	59.2	12.2	25.2.	38.5	6 3 12.15	4.59	37.35	+0.99	Bar. red. to 32° F.		
83	Bessel . . . 405	38.8	52.0	5.1	18.5	. .	6 4 5 15	3.75			27.904		
84	Mars . . . S.F.	. .	30.8	44.0	57.0	10.0	6 4 43.83	3.75	38.68	±0.00			
85	Bessel . . . 405	59.8	13.2	26.8	40.5	. .	6 6 26.63	3.95					
86	Mars . . . N.P.	. .	. .	4.5	17.8	30.5	6 7 4.39	4.95	37.76	+1.00			
87	Bessel . . . 405	55.5	8.5	21.6	. .	. .	6 9 21.74	3.79					
88	Mars . . . S.F.	. .	46.5	59.5	13.3	26.0	6 9 59.70	3.79	37.96	±0.00			
89	Bessel . . . 405	6.2	19.5	32.0	46.0	. .	6 12 32.49	3.59					
90	Mars . . . N.P.	. .	56.2	9.3	22.5	35.5	6 13 9.25	+4.60	+36.76	+1.01			

Remarks.

A tolerably good night for observations, occasionally varied by sudden changes in the atmospheric condition, which made both objects appear to move by jumps. The measures, however, are pretty fair.

a Recorded 36.5*s*. at wire D.
b Recorded 59.3*s*. at wire B.
c Micrometer recorded +3.47 rev.
d Recorded N. P.—omitted in results.
e Recorded 56.0*s*. at wire C.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean N. P. . .	Twenty transits . .	5 0 34.88	+41.927	+0.967	= 0 18.91
Mean S. F. . .	Twenty-four transits .	5 2 58.39	+42.923	—0.016	= 0 0.31

	s.		h. m. s.
Correction for chronometer at 5h 1m	—14.63	Santiago sid. time N. P.	5 0 20.25
Correction for chronometer at 5h 3m	—14.63	Santiago sid. time S. F.	5 2 43.76
		Interval	2 23.51

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	14.94	Δ N. S. limbs micr. in rev. . . . . . 0.986 =	19.22
Variation of A. R. in 2*m*. 23*s*.	+ 2.35	Variation of declination in 2*m*. 23*s*. . .	+ 0.00
Observed P. F. diameter	17.29	Corr. for diameter of micr. wires . . .	— 2.20
		Observed N. S. diameter	17.02

Δ ρ at 5h 0m . . . . 0.02″   Δ ρ at 5h 2m . . . . 0.00″

DECEMBER 26, 1849.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	37.8	51.2	. .	17.8	. .	3 38 4.34	+3.78			28.034	71.2	58.4
2	Bessel . . . 405	. .	37.5	50.5	4.0	16.8	3 38 50.58	3.18	—46.24	+0.60			
3	Mars . . . S.F.	21.1	34.5	47.5	1.0	. .	3 40 47.58	2.96			Ther. att. 67°.5		
4	Bessel . . . 405	. .	20.5	32.5	46.0	59.0	3 41 32.88	3.38	45.30	—0.42	Bar. red. to 32° F. 27.929		
5	Mars . . . N.P.	57.8	11.2	24.3	. .	. .	3 42 24.31	4.16					
6	Bessel . . . 405	44.5	57.5	11.0	24.0	36.8	3 43 10.76	+3.53	—46.45	+0.63			

DECEMBER 26, 1849—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
7	Mars . . .	S.F.	38.0	51.2	4.5	17.7	. .	3 45 4.40	+3.25			28 034	71.2	58.4
8	Bessel . . .	405	. .	37.0	50.0	3.3	. .	3 45 50.01	3.70	—45.61	—0.45			
9	Mars . . .	N.P.	2.5	15.8	28.8	42.0	. .	3 49 28.83	4.48			Ther. att. 67°.5		
10	Bessel . . .	405	. .	2.5	15.8	29.2	42.0	3 50 15.75	3.81	46.92	+0.67	Bar. red. to 32° F. 27.929		
11	Mars . . .	S.F.	44.8	58.2	11.5	25.0	. .	3 51 11.43	3.46					
12	Bessel . . .	405	31.0	44.0	57.2	10.6	23.5	3 51 57.26	3.83	45.83	—0.37			
13	Mars . . .	N.P.	13.7	27.2	40.3	53.8	. .	3 54 40.28	4.69					
14 *a*	Bessel . . .	405	1.5	14.0	27.8	41.0	53.5	3 55 27.56	3.97	47.28	+0.72			
15	Mars . . .	S.F.	59.0	12.3	25.3	39.0	. .	3 58 25.43	3.95					
16	Bessel . . .	405	45.5	58.5	11.8	25.0	37.8	3 59 11.72	4.33	46.29	—0.38			
17	Mars . . .	N.P.	45.2	58.5	11.8	25.3	. .	4 2 11.73	5.16					
18	Bessel . . .	405	33.2	46.5	59.8	13.2	25.8	4 2 59.70	4.48	47.97	+0.68			
19	Mars . . .	S.F.	24.8	38.0	51.0	4.5	. .	4 5 51.13	4.21					
20	Bessel . . .	405	. .	24.5	38.0	51.5	4.3	4 6 37.95	4.52	46.82	—0.31			
21	Mars . . .	N.P.	52.3	5.5	18.5	32.0	. .	4 9 18.63	5.37					
22	Bessel . . .	405	40.5	53.7	6.8	20.3	33.0	4 8 6.86	4.80	48.23	+0.57			
23	Mars . . .	S.F.	19.2	32.5	45.7	59.0	. .	4 11 45.65	4.56					
24	Bessel . . .	405	6.5	19.8	33.0	46.0	59.0	4 12 32.86	4.99	47.21	—0.43			
25 *b*	Mars . . .	N.P.	42.8	56.2	9.5	22.5	. .	4 13 9.30	5.66					
26	Bessel . . .	405	31.8	45.0	58.0	11.5	24.2	4 13 58.10	5.01	48.80	+0.65			
27 *c*	Mars . . .	S.F.	20.5	33.7	46.8	0.0	. .	4 16 46.80	4.70					
28	Bessel . . .	405	7.8	21.2	34.3	47.5	0.2	4 17 34.20	5.14	47.40	—0.44			
29 *d*	Mars . . .	N.P.	1.0	14.0	27.2	40.5	. .	4 19 27.23	5.84					
30 *e*	Bessel . . .	405	50.0	. .	16.5	29.6	42.3	4 20 16.31	5.15	49.08	+0.69			
31 *f*	Mars . . .	S.F.	58.3	11.5	24.8	38.3	. .	4 21 24.78	4.91					
32	Bessel . . .	405	46.5	59.8	13.0	26.2	39.0	4 22 12.90	5.29	48.12	—0.38			
33	Mars . .	N.P.	26.1	39.3	52.5	6.0	. .	4 24 52.53	5.99					
34	Bessel . . .	405	15.5	29.0	42.0	55.3	8.0	4 25 41.96	5.32	49.43	+0.67			
35 *g*	Mars . . .	S.F.	17.2	30.5	43.8	57.0	. .	4 27 43.68	5.01					
36	Bessel . . .	405	5.7	19.0	32.3	45.5	58.3	4 28 32.16	5.43	48.48	—0.42			
37 *e*	Mars . . .	N.P.	17.5	30.8	44.0	57.2	. .	4 30 43.93	6.13					
38	Bessel . . .	405	7.3	20.5	33.5	47.0	59.7	4 31 33.60	5.53	49.67	+0.60			
39	Mars . . .	S F.	2.0	15.2	28.3	41.5	. .	4 33 28.30	5.31					
40	Bessel . . .	405	50.8	3.9	17.1	30.2	43.2	4 34 17.04	5.74	48.74	—0.43			
41	Mars . . .	N.P.	43.8	57.5	10.2	23.5	. .	4 35 10.30	6.46					
42	Bessel . . .	405	34.0	47.2	0.3	14.0	26.7	4 36 0.44	5.80	50.14	+0.66			
43	Mars . . .	S.F.	22.0	35.2	48.5	1.7	. .	4 38 48.40	5.53					
44	Bessel . . .	405	11.0	24.2	37.2	50.8	3.5	4 39 37.34	5.89	48.94	—0.36			
45	Mars . . .	N P.	26.0	39.3	52.7	6.0	. .	4 41 52.55	6.64					
46	Bessel . . .	405	16.6	29.9	43.2	56.5	9.2	4 42 43.08	6.02	50.53	+0.62			
47	Mars . . .	S.F.	41.5	54.5	7.5	. .	. .	4 48 7.71	5.84					
48	Bessel . . .	405	31.0	44.3	57.2	10.6	23.5	4 48 57.32	6.17	49.61	—0.33			
49	Mars . . .	N P.	42.4	55.5	8.8	22.0	. .	4 50 8.73	6.94					
50	Bessel . . .	405	33.5	46.8	0.0	13.3	26.0	4 50 59.92	6.24	51.19	+0.70			
51	Mars . . .	S.F.	16.2	29.5	42.5	56.0	. .	4 53 42.60	5.99					
52	Bessel . . .	405	6.5	19.5	33.0	46.2	59.0	4 54 32.84	+6.34	—50.24	—0.35			

DECEMBER 26, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
53 *h*	Mars . . . N.P.	48.5	1.5	14.8	28.3	. .	4 55 14.83	+7.04			28.038	71.2	58.2
54	Bessel . . . 405	40.0	53.5	6.5	20.0	32.5	4 56 6.50	6.41	—51.67	+0.63			
55	Mars . . . S.F.	34.2	47.5	0.5	14.0	. .	4 58 0.60	6.19			Ther. att. 67°.5		
56	Bessel . . . 405	24.5	37.5	51.0	4.3	17.0	4 58 50.86	6.50	50.26	—0.31	Bar. red. to 32° F. 27.929		
57	Mars . . . N.P.	42.5	55.8	9.2	22.5	. .	5 5 9.05	7.38					
58	Bessel . . . 405	34.8	48.0	1.2	14.8	27.5	5 6 1.26	6.74	52.21	+0.64			
59	Mars . . . S.F.	0.0	13.2	26.2	39.7	. .	5 8 26.33	6.45					
60	Bessel . . . 405	51.0	4.2	17.5	30.7	43.5	5 9 17.38	6.85	51.05	—0.40			
61	Mars . . . N.P.	29.5	43.0	56.3	. .	. .	5 10 56.14	7.56					
62	Bessel . . . 405	22.5	35.3	48.7	2.5	15.0	5 11 48.76	6.96	52.62	+0.60			
63	Mars . . . S.F.	2.1	15.5	28.5	42.2	. .	5 13 28.63	6.64					
64	Bessel . . . 405	53.5	6.5	20.0	33.5	46.2	5 14 19.94	6.99	51.13	—0.35			
65	Mars . . . N.P.	23.5	37.0	50.3	3.7	. .	5 16 50.18	7.69					
66	Bessel . . . 405	16.8	30.0	43.3	56.6	9.3	5 17 43.20	7.04	53.02	+0.65			
67	Mars . . . S.F	57.0	10.5	23.5	37.0	. .	5 18 23.55	6.76					
68	Bessel . . . 405	49.0	2.0	15.3	28.8	41.5	5 19 15.32	7.18	51.77	—0.42			
69	Mars . . . N.P.	37.5	50.6	4.0	17.5	. .	5 21 3.95	3.03					
70	Bessel . . . 405	30.6	44.0	57.2	10.5	23.2	5 21 57.10	2.33	53.15	+0.70			
71	Mars . . . S.F.	31.3	47.5	0.8	14 0	. .	5 24 0.70	2.04					
72	Bessel . . . 405	26.5	39.8	53.0	6.5	19.0	5 24 52.96	2.43	52.26	—0.39			
73	Mars . . . N.P.	32.8	45.8	59.1	12.5	. .	5 28 59.10	3.87					
74	Bessel . . . 405	26.5	39.7	52.8	6.2	19.2	5 29 52.88	3.26	53.78	+0.61			
75	Mars . . . S.F.	30.6	44.0	56.5	. .	. .	5 31 56.91	2.96					
76	Bessel . . . 405	23.4	36.3	49.7	3.3	16.0	5 32 49.74	3.34	52.83	—0.38			
77	Mars . . . N.P.	0.2	13.3	26.5	40.0	. .	5 34 26.55	3.94					
78	Bessel . . . 405	54.2	7.5	20.5	34.3	47.0	5 35 20.70	3.41	54.15	+0.53			
79	Mars . . . S.F.	21.0	34.3	47.2	0.5	. .	5 36 47.30	3.09					
80	Bessel . . . 405	14.0	27.0	40.2	53.8	6.5	5 37 40.30	3.49	53.00	—0.40			
81	Mars . . . N.P.	45.0	58.2	11.3	24.8	. .	5 38 11.38	4.13					
82	Bessel . . . 405	39.5	52.8	6.0	19.5	32.0	5 39 5.96	3.47	54.58	+0.66			
83	Mars . . . S F.	25.2	38.0	51.5	5.0	. .	5 41 51.48	3.17					
84 *i*	Bessel . . . 405	18.5	31.6	45.0	58.5	11.2	5 42 44.96	3.50	53.48	—0.33			
85 *d*	Mars . . . N.P.	21.2	34.5	47.6	1.0	. .	5 44 47.63	4.22					
86	Bessel . . . 405	16.0	29.2	42.5	55.8	8.5	5 45 42.40	3.61	54.77	+0.61			
87	Mars . . . S.F.	57.4	10.5	23.8	37.3	. .	5 46 23.80	3.27					
88	Bessel . . . 405	51.0	4.3	17.5	31.0	43.7	5 47 17.50	3.64	53.70	—0.37			
89	Mars . . . N.P.	21.0	34.5	47.5	0.5	. .	5 49 47.30	4.38					
90	Bessel . . . 405	15.5	28.8	42.5	56.0	8.8	5 50 42.32	3.68	55.02	+0.70			
91	Mars . . . S F.	4.3	17.8	30.8	44.2	. .	5 54 30.83	3.33					
92	Bessel . . . 405	58.5	11.7	25.0	38.3	51.0	5 55 24.90	3.71	54.07	—0.38			
93	Mars . . . N.P.	32.6	46.0	59.0	12.5	. .	5 56 59.08	4.43					
94	Bessel . . . 405	28.2	41.5	54.7	8.1	21.0	5 57 54.70	3.73	55.62	+0.70			
95	Mars . . . S.F.	22.5	35.5	48.8	2.0	15.0	5 59 48.76	3.40					
96	Bessel . . . 405	17.2	30.5	43.5	57.0	9.5	6 0 43.54	3.82	54.78	—0.42			
97	Mars . . . N.P.	48.0	1.5	14.5	27.8	40.8	6 1 14 52	4.50					
98	Bessel . . . 405	44.2	57.0	10.3	23.8	36.5	6 2 10.36	+3.77	—55.84	+0.73			

5 °

DECEMBER 26, 1849—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
99	Mars	S F.	26.5	40.0	53.2	6.4	19.5	6 4 53.12	+3.51			28.038	71.2	58.2
100	Bessel	405	22.0	35.5	48.1	1.5	14.3	6 5 48.28	3.94	—55.16	—0.43			
101	Mars	N P.	6.5	20.0	33.0	46.5	59.0	6 7 33.00	4.54			Ther. att. 67°.5		
102	Bessel	405	. .	16.2	29.2	42.3	55.5	6 8 29.18	3.97	56.18	+0.57	Bar. red. to 32° F. 27.929		
103	Mars	S.F.	25.8	39.0	52.2	5.5	18.5	6 13 52.20	3.62					
104	Bessel	405	. .	34.5	47.5	1.0	14.0	6 14 47.63	4.02	55.43	—0.40			
105	Mars	N.P.	6.0	19.5	32.5	46.0	58.5	6 16 32.50	4.67					
106	Bessel	405	. .	16.5	29.5	43.0	55.7	6 17 29.55	4.11	57.05	+0.56			
107	Mars	S.F.	58.0	11.5	24.5	38.0	51.0	6 18 24.60	3.65					
108	Bessel	405	54.0	7.5	20.5	34.0	46.5	6 19 20.50	4.07	55.90	—0.42			
109	Mars	N.P.	50.5	3.7	16.8	30.2	43.0	6 21 16.84	4.67					
110	Bessel	405	. .	1.2	14.2	27.7	40.5	6 22 14.28	4.09	57.44	+0.58			
111	Mars	S.F.	25.0	38.2	51.2	5.0	17.5	6 24 51.38	3.59					
112	Bessel	405	21.2	34.2	47.6	1.2	13.8	6 25 47.60	4.02	56.22	—0.43			
113	Mars	N.P.	19.8	33.2	46.2	59.5	13.5	6 27 46.44	4.65					
114	Bessel	405	17.8	31.0	44.0	57.3	10.2	6 28 44.06	4.06	57.62	+0.59			
115	Mars	S.F.	6.5	19.5	32.8	46.5	59.0	6 30 32.86	3.65					
116	Bessel	405	3.0	. .	29.5	43.0	55.5	6 31 29.46	4.04	56.60	—0.39			
117	Mars	N.P.	53.0	6.3	19.5	33.1	45.8	6 32 19.54	4.70					
118	Bessel	405	. .	4.5	17.5	31.2	44.0	6 33 17.68	4.16	58.14	+0.54			
119	Mars	S.F.	31.2	44.5	57.8	11.0	24.2	6 35 57.74	3.78					
120	Bessel	405	28.2	41.5	54.5	8.2	21.0	6 36 54.68	+4.19	—56.94	—0.41			

Remarks

At the commencement of observations (being seen through the cold stratum of air near the Cordilleras) Mars and the comparing star were quite flaring and unsteady. At 4*h*. the images were better defined, and capable of being measured more accurately

a Recorded 22.8*s*. at wire C.
b Both objects unsteady.
c Micrometer recorded + 3.70 rev.
d Good measures.
e Good observations.
f Recorded 58.3*s*. at wire D.
g Mars unsteady.
h Good.
i Recorded 5.0*s*. at wire C.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean N. P.	Thirty transits	5 5 17.32	—52.163	+0.635	=0 12.38
Mean S. F.	Thirty transits	5 8 30.62	—51.112	—0.390	=0 7.60

	s.		h. m. s.
Correction for chronometer at 5 5	—15.37	Santiago sid. time N. P.	5 5 1.95
Correction for chronometer at 5 8	—15.37	Santiago sid. time S. F.	5 8 15.25
		Interval	3 13.30

	″		″
Δ P. F. limbs in A. R. reduced to arc	15.76	Δ N. S. limbs micr. in rev.	1.025 = 19.98
Variation of A. R. in 3*m*. 13*s*.	+ 3.06	Variation of declination in 3*m*. 13*s*.	— 0.02
Observed P. F. diameter	18.82	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	17.76

	″		″
Δ ρ at 5 5 (h. m.)	0.01	Δ ρ at 5 9 (h. m.)	0.00

DECEMBER 27, 1849.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	15.5	28.2	41.7	55.3	8.0	3 54 41.74	+4.53			28.148	70.1	59.1
2	Bessel . . . 405	34.5	47.7	0.7	14.0	26.8	3 57 0.74	4.53	−2 19.00	±0.00			
3	Mars . . . S.F.	22.6	35.6	49.0	2.5	15.0	4 2 49.40	2.49			Ther. att. 68°.5		
4	Bessel . . . 405	41.0	54.0	7.3	20.7	33.5	4 5 7.30	3.63	2 17.90	−1.14	Bar. red. to 32° F.		
5	Mars . . . N.P.	24.8	38.0	51.5	4.7	17.5	4 6 51.30	3.82			28.040		
6	Bessel . . . 405	44.2	58.0	11.2	24.6	37.3	4 9 11.06	3.89	2 19.76	0.07			
7	Mars . . . S.F.	54.2	7.5	20.5	34.3	47.0	4 12 20.70	3.33					
8	Bessel . . . 405	13.0	26.2	39.2	52.7	5.2	4 14 39.26	4.20	2 18.56	−0.87			
9	Mars . . . N.P.	44.3	57.8	10.8	24.0	36.8	4 16 10.74	5.33					
10	Bessel . . . 405	4.0	18.0	31.1	44.5	57.3	4 18 30.98	5.33	2 20.24	±0.00			
11	Mars . . . S.F.	55.2	8.5	21.8	35.1	47.8	4 20 21.68	1.01					
12	Bessel . . . 405	14.3	27.8	41.0	54.5	7.0	4 22 40.92	2.10	2 19.24	−1.09			
13	Mars . . . N.P.	51.4	4.5	17.5	30.8	43.5	4 24 17.54	2.43					
14	Bessel . . . 405	12.2	25.3	38.3	51.4	4.6	4 26 38.36	2.43	2 20.82	±0.00			
15	Mars . . . S.F.	9.0	22.5	35.3	48.5	1.5	4 28 35.36	1.56					
16	Bessel . . . 405	29.0	42.0	55.3	8.8	21.5	4 30 55.32	2.60	2 19.96	−1.04			
17	Mars . . . N.P.	17.7	31.0	44.3	57.8	10.5	4 32 41.26	2.51					
18	Bessel . . . 405	39.0	52.5	5.8	19.0	32.0	4 35 5.66	2.57	2 21.40	0.06			
19	Mars . . . S.F.	43.2	56.5	9.7	23.0	35.8	4 37 9.64	1.56					
20	Bessel . . . 405	4.0	17.0	30.2	43.6	56.5	4 39 30.26	2.55	2 20.62	0.99			
21	Mars . . . N.P.	48.8	2.2	15.4	28.5	41.2	4 41 15.22	2.48					
22	Bessel . . . 405	10.5	24.0	37.2	50.5	3.7	4 43 37.18	2.57	2 21.96	0.09			
23	Mars . . . S.F.	48.0	1.2	14.3	27.7	40.5	4 46 14.34	1.58					
24 *a*	Bessel . . . 405	9.0	22.3	35.5	48.8	51.5	4 48 35.42	2.67	2 21.08	−1.09			
25	Mars . . . N.P.	31.3	44.3	57.5	11.0	23.7	4 50 57.56	2.82					
26	Bessel . . . 405	53.7	7.0	20.2	33.5	46.2	4 53 20.08	2.82	2 22.52	±0.00			
27	Mars . . . S.F.	44.8	58.0	10.5	24.5	37.3	4 55 11.02	1.85					
28	Bessel . . . 405	6.0	19.8	33.0	46.2	59.0	4 57 32.80	2.89	2 21.78	−1.04			
29	Mars . . . S.F.	18.5	31.7	44.7	58.2	11.0	5 3 44.82	1.98					
30	Bessel . . . 405	40.5	54.3	7.2	20.5	33.0	5 6 7.10	3.06	2 22.28	1.08			
31	Mars . . . N.P.	15.5	29.0	42.1	55.5	8.2	5 9 42.06	3.17					
32	Bessel . . . 405	39.5	52.7	6.0	19.2	32.0	5 12 5.88	3.26	2 23.82	0.09			
33 *b*	Mars . . . S.F.	13.5	26.8	40.0	53.2	6.0	5 13 39.90	2.27					
34	Bessel . . . 405	36.0	50.0	3.0	16.5	29.0	5 16 2.94	3.36	2 23.04	1.09			
35	Mars . . . N.P.	1.0	14.3	27.5	40.7	53.5	5 18 27.40	3.40					
36	Bessel . . . 405	25.0	38.8	51.2	5.5	18.0	5 20 51.70	3.48	2 24.30	0.08			
37	Mars . . . S.F.	17.0	30.2	43.2	56.5	9.3	5 22 43.24	2.49					
38	Bessel . . . 405	. .	53.5	6.7	20.0	33.0	5 25 6.68	3.54	2 23.44	1.05			
39	Mars . . . N.P.	6.0	19.3	32.5	45.8	58.5	5 27 32.42	3.53					
40	Bessel . . . 405	31.0	44.2	57.5	11.0	23.8	5 29 57.50	3.64	2 25.08	0.11			
41	Mars . . . S.F.	19.3	32.5	45.5	59.0	11.8	5 31 45.62	2.63					
42	Bessel . . . 405	43.5	56.7	9.8	23.2	36.0	5 34 9.84	3.75	2 24.22	1.12			
43 *c*	Mars . . . N.P.	43.3	56.8	9.9	23.0	36.0	5 36 9.80	3.69					
44	Bessel . . . 405	8.0	22.2	35.2	48.8	1.5	5 38 35.14	3.84	2 25.34	0.15			
45 *d*	Mars . . . S.F.	52.5	6.0	19.2	32.5	45.2	5 40 19.08	2.84					
46	Bessel . . . 405	17.3	30.5	43.7	57.2	10.0	5 42 43.74	+3.93	−2 24.66	−1.09			

DECEMBER 27, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Mars . . . N.P.	15.8	29.0	42.4	55.8	8.2	5 44 42.24	+4.06			28.148	70.1	59.1
48	Bessel . . . 405	42.5	55.0	9.0	22.2	35.2	5 47 8.78	4.00	−2 26.54	+0.06			
49	Mars . . . S.F.	21.3	35.0	47.5	1.2	14.0	5 48 47.80	3.03			Ther. att. 68°.5 Bar. red. to 32° F. 28.040		
50	Bessel . . . 405	46.8	59.8	13.1	26.4	39.2	5 51 13.06	4.11	2 25.26	−1.08			
51	Mars . . . N.P.	50.5	3.5	17.0	30.5	43.2	5 53 16.94	4.17					
52	Bessel . . . 405	17.5	30.7	43.8	57.0	10.2	5 55 43.84	4.20	2 26.90	0.03			
53	Mars . . . S.F.	54.3	7.5	20.7	34.2	47.0	5 57 20.74	3.21					
54	Bessel . . . 405	19.5	33.2	46.5	0.0	12.7	5 59 46.38	4.32	2 25.64	1.11			
55	Mars . . . N.P.	54.7	8.0	20.5	34.5	47.2	6 1 20.98	4.33					
56	Bessel . . . 405	22.3	35.5	48.8	2.2	15.0	6 3 48.76	4.42	2 27.78	0.09			
57	Mars . . . S.F.	46.0	59.2	12.3	25.8	38.2	6 6 12.30	3.37					
58	Bessel . . . 405	12.3	25.7	39.0	52.4	5.3	6 8 38.98	4.37	2 26.68	1.00			
59	Mars . . . N.P.	47.0	0.5	13.5	27.0	39.6	6 10 13.52	4.45					
60	Bessel . . . 405	14.5	28.5	41.3	55.0	7.8	6 12 41.42	4.55	2 27.90	0.10			
61	Mars . . . S.F.	3.9	17.5	30.5	44.0	56.8	6 15 30.54	3.40					
62	Bessel . . . 405	31.0	44.0	57.0	10.5	23.3	6 17 57.16	4.47	2 26.62	1.07			
63	Mars . . . N.P.	40.5	53.8	6.8	20.2	33.0	6 20 6.86	4.43					
64	Bessel . . . 405	9.0	22.3	35.3	48.8	1 5	6 22 35.38	4.56	2 28.52	0.13			
65	Mars . . . S.F.	15.5	29.0	42.0	55.2	8.0	6 24 41.94	3.50					
66	Bessel . . . 405	43.3	56.5	9.7	23.2	36.0	6 27 9.74	4.60	2 27.80	1.10			
67	Mars . . . N.P.	21.2	34.5	47.5	1.0	13.8	6 28 47.60	4.50					
68	Bessel . . . 405	50.5	3.8	16.5	30.3	42.8	6 31 16.78	4.55	2 29.18	0.05			
69 *e*	Mars . . . S.F.	33.5	46.8	59.8	13.3	26.0	6 32 59.88	3.44					
70	Bessel . . . 405	2.8	16.5	29.5	42.8	55.7	6 35 29.46	4.60	2 29.58	1.16			
71	Mars . . . N.P.	57.5	10.8	23.8	37.2	50.2	6 37 23.92	4.48					
72	Bessel . . . 405	27.2	40.5	53.5	7.0	19.8	6 39 53.60	4.62	2 29.68	0.14			
73	Mars . . . S.F.	28.8	42.0	55.2	8.5	21.3	6 41 55.16	3.97					
74	Bessel . . . 405	. .	11.0	24.0	37.5	50.2	6 44 24.05	5.17	2 28.89	1.20			
75	Mars . . . N.P	47.6	0.7	14.0	27.2	39.8	6 46 13.86	4.61					
76	Bessel . . . 405	18.2	31.2	44.5	58.0	10.7	6 48 44.52	4.63	2 30.66	0.02			
77	Mars . . . S.F.	17.5	31.0	44.0	57.5	10.2	6 51 44.04	3.22					
78	Bessel . . . 405	47.2	0.5	13.3	27.0	39.8	6 54 13.56	+4.45	−2 29.52	−1.23			

Remarks.

At the commencement of observations both objects were blazing and very unsteady, rendering contacts difficult to appreciate; nor was there much change for the better at any time before 5*h*. 30*m*.

a Recorded 5.5*s*. at wire E.

b Micrometer recorded +3.27 rev.

c Good measures.

d The succeeding observations are better until 6*h*. 36*m*., when the vibrating motion and blazing appearance of both objects recommenced.

e Very tremulous.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Nineteen transits . .	5 23 12.42	−2 24.810	−0.055 . . .	=0 1.07
Mean S. F. . . .	Twenty transits . .	5 26 42.35	−2 23.838	−1.082 . . .	=0 21.09

DECEMBER 27, 1849—Continued.

Results—Continued.

	h. m.	s.
Correction for chronometer at	5 23	—16.11
Correction for chronometer at	5 26	—16.11

	h. m. s.
Santiago sid. time N. P.	5 22 56.31
Santiago sid. time S. F.	5 26 26.24
Interval	3 29.93

	"
Δ P. F. limbs in A. R. reduced to arc	14.58
Variation of A. R. in 3*m.* 30*s.*	+ 3.29
Observed P. F. diameter	17.69

	"
Δ N. S. limb micr. in rev	1.027 = 20.02
Variation of declination in 3*m.* 30*s.*	— 0.04
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	17.78

	h. m.	"
Δ ρ at	5 24	0.00
Δ ρ at	5 28	0.02

DECEMBER 28, 1849.

It was found impossible to observe the selected star to-night, because of the vicinity of the moon, a slight haze, and its apparently lesser magnitude than is assigned in Bessel's Zones. It would bear no illumination whatever, and could scarcely have exceeded the 10th magnitude. J. M. G.

DECEMBER 29, 1849.

The remarks of last night are applicable to this, and the haze is somewhat greater. I do not think the star can exceed the 10th or 11th magnitude. Efforts to measure its distance from Mars proved wholly ineffectual. J. M. G.

DECEMBER 30, 1849.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	405	3.5	16.8	30.2	43.8	56.7	3 10 30.20	+1.63			28.178	72.1	59.3
2	Mars . . .	N.P.	21.0	34.2	47.5	1.0	13.5	3 11 47.42	9.13	+1 17.22	+7.50			
3	Bessel . . .	405	37.2	50.8	3.5	17.0	30.0	3 15 3.50	2.15			Ther. att. 70°.5		
4 *a*	Mars . . .	S.F.	55.8	8.8	21.5	34.5	47.3	3 16 21.58	8.58	1 18.08	6.43	Bar. red. to 32° F.		
5 *b*	Bessel . . .	405	53.5	. .	19.5	33.0	45.8	3 22 19.66	2.59			28.064		
6	Mars . . .	N.P.	9.5	. .	35.8	49.3	2.0	3 23 35.86	10.05	1 16 20	7.46			
7	Bessel . . .	405	27.0	40.5	. .	6.8	19.5	3 27 53.46	0.78					
8	Mars . . .	S.F.	44.5	58.5	. .	24.3	37.0	3 29 11.08	7.29	1 17.62	6.51			
9	Bessel . . .	405	2.0	15.0	28.0	41.5	54.5	3 54 28.20	1.40					
10	Mars . . .	N.P.	16.5	30.0	42.8	56.2	8.5	3 55 42.80	8.94	1 14.60	7.54			
11	Bessel . . .	405	17.5	31.0	44.5	57.7	10.5	3 58 44.24	0.66					
12	Mars . . .	S.F.	34.0	46.8	0.0	13.6	26.0	4 0 0.08	7.09	1 15.84	6.43			
13	Bessel . . .	405	52.5	5.8	19.0	32.5	45.0	4 6 18.96	0.47					
14	Mars . . .	N.P.	6.5	. .	32.7	46.0	58.8	4 7 32.71	7.84	1 13.75	7.37			
15	Bessel . . .	405	53.2	6.3	19.6	33.0	45.5	4 12 19.52	. .					
16 *c*	Mars . . .	S.F.	7.7	21.0	34.3	47.7	0.3	4 13 34.20	. .	1 14.68	. .			
17	Bessel . . .	405	11.5	25.2	38.2	51.5	4.3	4 17 38.14	1.90					
18	Mars . . .	S.F.	26.2	39.5	52.5	5.7	18.8	4 18 52.54	8.27	1 14.40	6.37			
19	Bessel . . .	405	10.7	24.0	37.3	50.6	3.5	4 20 37.22	2.15					
20	Mars . . .	N.P.	23.8	36.8	49.5	3.5	16.2	4 21 49.96	9.46	1 12.74	7.31			
21	Bessel . . .	405	41.5	54.6	8.0	21.2	34.0	4 24 7.86	2.20					
22	Mars . . .	S.F	55.0	8.7	21.8	35.3	47.8	4 25 21.72	8.59	1 13.96	6.39			
23	Bessel . . .	405	10.0	23.2	36.8	49.3	2.5	4 27 36.36	2.24					
24	Mars . . .	N.P.	22.0	35.5	48.8	2.5	15.2	4 28 48.80	+9.65	+1 12.44	+7.41			

DECEMBER 30, 1849—Continued.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
25	Bessel' . . .	405	38.3	51.5	4.6	18.3	31.3	4 31 4.74	+1.40			28.178	72.1	59.3
26	Mars . . .	S.F.	51.5	5.2	18.5	31.8	45.5	4 32 18.50	7.79	+1 13.76	+6.39			
27	Bessel . . .	405	57.5	11.0	24.2	37 5	50.3	4 34 24.10	1.39			Ther. att. 70°.5		
28 *d*	Mars . . .	N.P.	9.6	22.8	36.0	49.0	2.0	4 35 35.88	8.79	1 11.78	7.40	Bar. red. to 32° F.		
29 *e*	Bessel . . .	405	20.5	34.0	47.2	0.5	13.5	4 37 47.14	1.27			28.064		
30	Mars . . .	S.F.	34.0	47.3	0.5	14.0	26.5	4 39 0.46	7.66	1 13.32	6.39			
31	Bessel . . .	405	7.9	21.0	34.0	47.5	0.5	4 41 34.18	1.48					
32	Mars . . .	N.P.	19.5	32.6	45.8	59.2	11 8	4 42 45.78	8.93	1 11 60	7.45			
33	Bessel . . .	405	30.5	44.0	57.1	10.5	23.2	4 44 57.06	1.55					
34	Mars . . .	S.F.	43.0	56.7	9.8	22.5	35.5	4 46 9.50	8.01	1 12.44	6.46			
35	Bessel . . .	405	45.0	58.3	11.3	25.0	37.6	4 49 11.44	1.69					
36	Mars . . .	N.P.	56.4	9.6	22.5	36.0	48.7	4 50 22.64	9.00	1 11.20	7.31			
37	Bessel . . .	405	49.5	2.5	15.8	29.0	41.8	4 52 15.80	1.73					
38	Mars . . .	S.F.	1.3	14.8	28.0	41.3	54.0	4 53 27.88	8.09	1 12.08	6.33			
39	Bessel . . .	405	53.5	6.8	20.0	33.3	46.0	4 56 19.92	1.76					
40	Mars . . .	N.P.	4.5	17.0	30.5	43.5	56.2	4 57 30.34	9.20	1 10.42	7.44			
41	Bessel . . .	405	8.8	22.2	35.2	48.8	1.3	4 59 35.26	1.62					
42	Mars . . .	S.F.	20.5	33.5	46.5	0.0	13.0	5 0 46.70	8.07	1 11.44	6.45			
43	Bessel . . .	405	7.2	20.3	33.5	47.0	59.8	5 2 33.56	1.76					
44	Mars . . .	N.P.	17.0	30.8	43.5	57.2	9.3	5 3 43.56	9.20	1 10.00	7.44			
45	Bessel . . .	405	57.2	10.5	23.5	37.3	50.2	5 6 23.74	1.87					
46	Mars . . .	N.P.	7.5	21.0	33.3	46.8	59.0	5 7 33.52	9.28	1 9.78	7.41			
47	Bessel . . .	405	36.0	49.0	2.3	15.7	28.3	5 12 2.26	1.93					
48 *f*	Mars . . .	S.F.	46.9	0.0	13.0	26.3	39.0	5 13 13.04	8.27	1 10.78	6.34			
49	Bessel . . .	405	5.0	18.2	31.3	44.7	57.5	5 15 31.34	2.02					
50	Mars . . .	N.P.	14.3	27.0	40.0	54.0	6.5	5 16 40.36	9.37	1 9.02	7.35			
51	Bessel . .	405	47.0	0.5	13.5	26.8	39.5	5 19 13.46	2.15					
52	Mars . . .	S.F.	57.8	11.0	24.0	37.5	51.0	5 20 24.26	8.42	1 10.80	6.27			
53	Bessel . . .	405	27.2	40.5	53.2	7.0	20.0	5 22 53.58	2.09					
54	Mars . . .	N.P.	36.5	49.5	2.3	15.8	28.3	5 24 2.48	9.42	1 8.90	7.33			
55	Bessel . . .	405	52.5	5.7	18.8	32.5	45.0	5 26 18.90	1.29					
56	Mars . . .	S.F.	2.5	15.7	28.8	42.2	55.0	5 27 28.84	7.80	1 9.91	6.51			
57	Bessel . . .	405	59.5	12.9	26.1	39.5	52.2	5 29 26.04	1.37					
58	Mars . . .	N P.	8.3	21.2	34.5	48.3	1.2	5 30 34.70	8.88	1 8.66	7.51			
59	Bessel . . .	405	3.5	16.6	30.0	43.2	56.0	5 32 29.86	1.54					
60	Mars . . .	S.F.	13.8	27.5	40.2	53.8	6.7	5 33 40.40	7.87	1 10.54	6.33			
61	Bessel . . .	405	16.0	29.5	42.3	55.5	8.5	5 35 42.36	1.55					
62	Mars . . .	N.P.	24.0	38.2	51.5	4.5	17.3	5 36 51.10	8.92	1 8.74	7.37			
63	Bessel . . .	405	37.5	51.0	4.3	17.7	30.5	5 39 4.20	1.61					
64	Mars . . .	S.F.	47.5	1.0	14.2	27.5	40.2	5 40 14.08	+8.00	+1 9.88	+6.39			

DECEMBER 30, 1849—Continued.

Remarks.

There being a slight haze or dry fog which prevents that flaring appearance so frequently presented by the planet, the night is favorable for observations.

a Recorded 37.5*s* at wire D, 50.3*s*. at E.
b Recorded 55.3*s*. at wire A.
c Neglected to read micrometer; observation omitted in mean result.
d Good measures.
e Micrometer recorded + 0.27 rev.
f All the succeeding measures are good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Sixteen transits . .	4 39 41.04	+ 1 11.687 . . .	+ 7.412	= 2 24.46
Mean S. F. . .	Fifteen transits . .	4 42 26.04	+ 1 12.992 . . .	+ 6.399	= 2 4.71

	s.		h. m. s.
Correction for chronometer at 4h 40m	− 17.87	Santiago sid. time N. P.	4 39 23.17
Correction for chronometer at 4 42	− 17.87	Santiago sid. time S. F.	4 42 8.17
		Interval	2 45.00

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	19.57	Δ N. S. limbs micr. in rev.	1.013 = 19.75
Variation of A. R. in 2*m*. 45*s*.	+ 2.34	Variation of declination in 2*m*. 45*s*. . .	− 0.07
Observed P. F. diameter	21.91	Corr. for diam. of micr. wires	− 2.20
		Observed N. S. diameter	17.48

	″		″
Δ ρ at 4h 39m	0.16	Δ ρ at 4h 42m	0.14

DECEMBER 31, 1849.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	4.5	. .	30.5	. .	56.8	3 52 30.69	+5.45			28.137	74.2	60.6
2	Bessel . . . 405	. .	. .	. .	51.4	.	3 52 37.98	±0.00	—7.29	+5.45			
3	Mars . . . S.F.	56.5	. .	23.0	. .	49.2	3 56 22.99	+4.56			Ther. att. 74°.2		
4	Bessel . . . 405	. .	15.2	. .	41.5	. .	3 56 28.23	±0.00	5.24	4.56	Bar red. to 32° F. 28.012		
5	Mars . . . N.P.	26.5	. .	53.0	. .	19.2	3 57 52.97	+5.48					
6	Bessel . . . 405	. .	46.5	. .	13.0	. .	3 57 59.63	±0.00	6.66	5.48			
7	Mars . . . S.F.	2.3	. .	29.0	. .	55.2	4 0 28.92	+4.66					
8	Bessel . . . 405	. .	22.0	. .	48.0	. .	4 0 34.88	±0.00	5.96	4.66			
9	Mars . . . N.P.	12.5	. .	39.7	. .	5.0	4 3 39.15	+5.53					
10	Bessel . . . 405	. .	32.8	. .	59.2	. .	4 3 45 88	±0.00	6.73	5.53			
11 *a*	Mars . . . S.F.	29.0	. .	55.5	. .	21.5	4 8 55.55	+4.70					
12	Bessel . . . 405	. .	48.7	. .	15.3	. .	4 9 1.88	±0.00	6.33	4.70			
13	Mars . . . N.P.	41.0	. .	. .	21.0	. .	4 12 7.52	+5.57					
14	Bessel . . . 405	. .	2.0	15.0	. .	. .	4 12 15.07	±0.00	7.55	5.57			
15	Mars . . S.F.	21.2	. .	48.0	. .	14.0	4 14 47.74	+4.60					
16	Bessel . . . 405	. .	41.3	. .	8.0	. .	4 14 54.53	±0.00	6.79	4.60			
17	Mars . . . N.P.	55.0	. .	. .	. .	47.5	4 18 21.29	+5.61					
18	Bessel . . . 405	. .	16.2	29.2	43.0	. .	4 18 29.40	±0.00	8.11	5.61			
19	Mars . . . S.F.	57.2	. .	23.5	. .	49.8	4 20 23.59	+4.59					
20	Bessel . . . 405	. .	17.3	. .	44.0	. .	4 20 30.53	±0.00	6.94	4.59			
21	Mars . . . N.P.	1.3	. .	28.0	41.0	. .	4 22 27.77	+5.62					
22	Bessel . . . 405	. .	23.0	36.0	49.5	2.3	4 22 36.08	±0.00	8.31	5.62			
23	Mars . . . S.F.	59.5	13.0	26.0	39.5	52.3	4 25 26.06	+4.77					
24	Bessel . . . 405	. .	20.2	33.2	46.5	59.2	4 25 33.16	±0.00	7.10	4.77			
25 *b*	Mars . . . N P.	26.0	. .	. .	. .	18.2	4 28 52.24	+5.74					
26	Bessel . . . 405	. .	47.3	. .	14.2	. .	4 29 0.63	±0.00	—8.39	+5.74			

DECEMBER 31, 1849—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
27	Mars . . . S.F.	29.3	43.0	56.5	9.7	22.5	4 32 56.20	+4.64			28.137	74.2	60.6
28 c	Bessel . . . 405	. .	50.5	4.0	17.2	30.2	4 33 3.85	±0.00	—7.65	+4.64			
29	Mars . . . N.P.	37.2	. .	. .	. .	30.0	4 36 3.74	+5.64			Ther. att. 74°.2		
30	Bessel . . . 405	46.5	59.7	13.0	26.4	39.0	4 36 12.92	±0.00	9.18	5.64	Bar. red. to 32° F.		
31	Mars . . . S.F.	53.5	7.0	20.2	33.5	46.2	4 41 20.08	+4.56			28.012		
32	Bessel . . . 405	. .	15.0	28.0	41.5	54.5	4 41 28.01	±0.00	7.93	4.56			
33	Mars . . . N.P.	16.3	29.4	. .	56.0	8.5	4 45 42.57	+5.56					
34	Bessel . . . 405	. .	39.2	52.3	5.0	18.3	4 45 52.08	±0.00	9.51	5.56			
35	Mars . . . S.F.	55.3	8.5	. .	.	47.5	4 55 21.40	+4.51					
36	Bessel . . . 405	. .	17.8	30.3	. .	56.9	4 55 30.66	±0.00	9.26	4.51			
37	Mars . . . N.P.	25.3	38.3	. .	. .	18.0	4 59 51.70	+5.56					
38	Bessel . . . 405	. .	49.0	2.2	. .	28.2	5 0 2.12	±0.00	10.42	5.56			
39	Mars . . . S.F.	44.0	57.5	. .	23.8	. .	5 1 10.38	+4.54					
40	Bessel . . . 405	. .	6.5	20.0	33.5	45.5	5 1 20.26	±0.00	9.88	4.54			
41	Mars . . . N.P.	29.5	.	56.0	9.5	22.0	5 6 55.96	+5.59					
42	Bessel . . . 405	40.5	53.5	.	. .	33.0	5 7 6.83	±0.00	10.87	5.59			
43	Mars . . . S.F.	30.0	. .	. .	9.0	. .	5 8 56.02	+4.54					
44	Bessel . . . 405	39.8	53.0	6.8	. .	32.0	5 9 6.26	±0.00	10.24	4.54			
45	Mars . . . N.P.	5.5	19.0	. .	45.5	58.0	5 15 32.02	+5.54					
46	Bessel . . . 405	. .	. .	42.5	. .	9.5	5 15 42.90	±0.00	10.88	5.54			
47	Mars . . . S.F.	12.5	. .	38.8	52.2	5.5	5 18 38.96	+4.51					
48	Bessel . . . 405	. .	36.0	. .	2.5	. .	5 18 49.13	±0.00	10.27	4.51			
49	Mars . . . N.P.	47.5	0.8	. .	27.8	40.5	5 20 14.17	+5.52					
50	Bessel . . . 405	. .	12.5	25.5	. .	52.0	5 20 25.66	±0.00	10.49	5.52			
51	Mars . . . S.F.	28.2	41.5	. .	8.0	21.0	5 24 54.69	+4.51					
52	Bessel . . . 405	. .	51.0	4.5	. .	31.3	5 25 4.59	±0.00	9.90	4.51			
53	Mars . . . N.P.	23.8	37.2	50.5	3.5	16.5	5 26 50.30	+5.52					
54 d	Bessel . . . 405	. .	50.0	3.0	. .	28.5	5 27 2.83	±0.00	12.53	5.52			
55	Mars . . . S.F.	30.3	43.5	56.5	10.5	. .	5 31 56.75	+4 55					
56	Bessel . . . 405	40.5	53.5	7.5	21.0	34.0	5 32 7.30	±0.00	10.55	4.55			
57	Mars . . . N.P.	31.5	44.8	58.0	. .	24.3	5 35 58.10	+5.54					
58	Bessel . . . 405	. .	57.5	10.5	24.0	. .	5 36 10.58	±0.00	12.48	5.54			
59	Mars . . . S.F.	43.2	56.5	9.5	22.5	35.5	5 39 9.44	+4.53					
60	Bessel . . . 405	. .	8.0	21.0	34.5	47.5	5 39 21.13	±0.00	11.69	4.53			
61	Mars . . . N.P.	34.3	48.0	. .	. .	. .	5 46 0.98	+5.53					
62	Bessel . . . 405	. .	0.5	14.0	. .	40.2	5 46 13.89	±0.00	12.91	5.53			
63	Mars . . . S F.	37.0	50.5	. .	17.5	29.2	5 52 3.57	+4.56					
64	Bessel . . . 405	. .	2.3	. .	. .	41.5	5 52 15.40	±0.00	11.83	4.56			
65	Mars . . N.P.	38.0	51.2	. .	17.8	30.5	5 55 4.39	+5.50					
66	Bessel . . . 405	. .	5.0	. .	. .	44.0	5 55 18.00	±0.00	13.61	5.50			
67	Mars . . . S F.	18.5	32.0	. .	58.2	11.0	5 57 44.94	+4.52					
68	Bessel . . . 405	. .	44.2	. .	. .	23.5	5 57 57.35	±0.00	12.41	4.52			
69	Mars . . . N.P.	13.5	27.2	. .	54 5	7.0	6 0 40.57	+5.48					
70	Bessel . . . 405	. .	. .	. .	. .	21.3	6 0 55.12	±0.00	14.55	5.48			
71	Mars . . . S.F.	40.2	53.5	. .	20.0	32.5	6 5 6.57	+4.49					
72	Bessel . . . 405	. .	6.5	. .	. .	45.8	6 5 19.65	±0.00	—13.08	+4.49			

DECEMBER 31, 1849—Continued.

Remarks.

Owing to the vicinity of the objects, it was extremely difficult to place each accurately in contact with its wire, when on the meridian wire. The first and second sets of measures are indifferent.

a Recorded 39s. at wire A.
b Poor measures.
c Recorded 32s. at wire E.
d Recorded 40s. at wire B; 53s. at wire C.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean N. P.	Eighteen transits	4 53 29.17	− 10.032	+ 5.554	= 1 48.25
Mean S. F.	Eighteen transits	4 57 32.44	− 9.058	+ 4.574	= 1 29.15

	h. m.	s.
Correction for chronometer at	4 53	+ 18.63
Correction for chronometer at	4 57	+ 18.63

	h. m. s.
Santiago sid. time N. P.	4 53 10.54
Santiago sid. time S. F.	4 57 13.81
Interval	4 3.27

	″
Δ P. F. limbs in A. R. reduced to arc	14.61
Variation of A. R. in 4*m*. 3*s*.	+ 3.33
Observed P. F. diameter	17.94

	″
Δ N. S. limbs micr. in rev.	0.980 = 19.10
Variation of declination in 4*m*. 3*s*.	+ 0.11
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	16.79

	h. m.	″
Δ ρ at	4 53	0.12
Δ ρ at	4 57	0.10

JANUARY 1, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars	N.P.	12.5	25.5	38.8	52.2	5.0	3 15 38.80	+6.40			28.188	74.5	58.3
2	Bessel	405	35.5	48.3	1.2	15.5	27.8	3 17 1.66	3.01	−1 22.86	+3.39			
3	Mars	S.F.	12.5	25.5	38.8	52.2	5.0	3 19 38.80	5.57			Ther. att. 71°.5		
4	Bessel	405	34.0	47.2	0.2	13.8	26.5	3 21 0.34	3.12	1 21.54	2.45	Bar. red. to 32° F. 28.071		
5	Mars	N.P.	50.3	3.5	16.8	30.1	43.0	3 23 16.74	+3.48					
6	Bessel	405	13.7	26.8	39.7	53.2	6.0	3 24 39.88	±0.00	1 23.14	3.48			
7	Mars	S.F	55.7	9.2	22.2	35.8	48.6	3 29 22.30	+3.48					
8	Bessel	405	18.2	31.5	44.4	58.0	10.6	3 30 44.54	1.21	1 22.24	2.27			
9	Mars	N.P.	4.5	18.0	31.0	44.5	57.1	3 33 31.02	4.79					
10	Bessel	405	28.2	41.5	54.8	8.2	21.0	3 34 54.74	1.46	1 23.72	3.33			
11 *a*	Mars	S.F.	53.0	6.5	19.5	32.8	45.8	3 37 19.52	4.15					
12	Bessel	405	15.5	29.0	42.2	55.3	8.1	3 38 42.02	1.90	1 22.50	2.25			
13	Mars	S.F.	1.1	14.5	27.4	40.8	53.3	3 44 27.42	4.49					
14	Bessel	405	. .	37.5	50.5	4.0	16.6	3 45 50.53	2.11	1 23.11	2.38			
15 *a*	Mars	N.P.	35.3	48.5	1.7	15.3	27.8	3 49 1.72	5.73					
16	Bessel	405	0.0	13.5	26.5	39.5	52.5	3 50 26.40	2.35	1 24.68	3.38			
17 *a*	Mars	N.P.	37.2	50.5	3.5	16.8	29.8	3 53 3.56	5.86					
18	Bessel	405	2.0	15.2	28.3	41.7	54.5	3 54 28.34	2.48	1 24.78	3.38			
19	Mars	S.F.	0.5	. .	27.0	40.5	53.2	4 7 27.01	4.22					
20	Bessel	405	25.2	38.3	51.5	5.0	17.3	4 8 51.46	1.97	1 24.45	2.25			
21	Mars	N.P.	34.0	47.2	0.2	13.5	26.5	4 11 0.28	5.39					
22	Bessel	405	0.0	13.2	26.4	39.8	52.3	4 12 26.34	2.04	1 26.06	3.35			
23 *b*	Mars	S.F.	56.8	10.0	23.0	36.5	49.3	4 14 23.12	4.58					
24	Bessel	405	21.8	35.0	48.0	1.3	14.0	4 15 48.02	+2.23	−1 24.90	+2.35			

JANUARY, 1, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
25 *c*	Mars . . .	N.P.	20.3	33.5	46.5	0.0	12.8	4 17 46.62	+5.69			28.188	74.5	58.3
26	Bessel . . .	405	46.7	0.0	13.2	26.5	39.3	4 19 13.14	2.34	—1 26.52	+3.35			
27	Mars . . .	S.F.	51.3	5.2	18.2	31.5	44.3	4 22 18.10	5.08			Ther. att. 71°.5 Bar. red. to 32° F. 28.071		
28	Bessel . .	405	17.0	30.4	43.4	57.0	9.3	4 23 43.42	2.77	1 25.32	2.31			
29	Mars . .	N.P.	7.5	20.8	33.8	47.2	0.0	4 25 33.86	6.19					
30	Bessel . . .	405	34.1	47.2	0.8	14.2	26.5	4 27 0.56	2.86	1 26.70	3.33			
31 *d*	Mars . . .	S.F.	33.2	46.7	59.8	13.2	25.0	4 28 59.58	5.28					
32	Bessel . . .	405	59.0	12.0	25.2	38.5	51.2	4 30 25.18	3.03	1 25.60	2.25			
33 *e*	Mars . . .	N.P.	43.2	56.5	9.5	22.8	35.5	4 32 9.50	6.37					
34	Bessel . . .	405	10.1	23.2	36.5	50.0	2.5	4 33 36.46	3.09	1 26.96	3.28			
35	Mars . . .	S.F.	55.5	9.2	22.0	35.5	48.2	4 35 22.08	5.53					
36	Bessel . . .	405	21.5	34.7	48.0	1.5	14.2	4 36 47.98	3.22	1 25.90	2.31			
37	Mars . . .	N.P.	58.0	11.2	24.5	37.6	50.5	4 41 24.36	6.73					
38	Bessel . . .	405	25.5	38.8	51.8	5.3	18.0	4 42 51.88	3.40	1 27.52	3.33			
39	Mars . . .	S.F.	0.8	13.8	27.2	40.5	53.2	4 45 27.10	5.83					
40	Bessel . . .	405	27.2	40.5	53.5	7.0	19.5	4 46 53.54	3.55	1 26.44	2.28			
41	Mars . . .	N.P.	13.5	26.8	39.8	53.2	6.0	4 48 39.86	6.96					
42	Bessel . . .	405	41.0	54.5	8.0	21.0	34.0	4 50 7.70	3.69	1 27.84	3.27			
43	Mars . . .	S.F.	59.5	12.5	25.5	39.3	52.0	4 52 25.76	2.92					
44	Bessel . . .	405	26.3	39.5	52.8	6.2	19.0	4 53 52.76	0.68	1 27.00	2.24			
45	Mars . . .	N.P.	17.7	31.0	44.2	57.4	10.3	4 55 44.12	3.96					
46	Bessel . . .	405	46.0	59.2	12.5	26.0	38.5	4 57 12.44	0.70	1 28.32	3.26			
47	Mars . . .	S.F.	33.4	46.8	0.0	13.5	26.2	4 58 59.98	3.00					
48	Bessel . . .	405	1.0	14.5	27.2	41.0	53.5	5 0 27.44	0.73	1 27.06	2.27			
49	Mars . . .	N.P.	50.5	3.5	16.8	30.2	43.0	5 3 16.80	3.94					
50	Bessel . . .	405	19.0	32.3	45.5	59.0	11.8	5 4 45.52	0.57	1 28.72	3.37			
51	Mars . . .	S.F.	32.6	46.0	59.2	12.5	25.2	5 7 59.10	4.67					
52	Bessel . . .	405	0.5	14.0	27.0	40.4	53.2	5 9 27.02	2.36	1 27.92	2.31			
53	Mars . . .	N.P.	2.2	15.3	28.5	41.8	54.5	5 11 28.46	4.54					
54	Bessel . . .	405	31.3	44.5	57.7	11.0	23.5	5 12 57.60	1.29	1 29.14	3.25			
55	Mars . . .	S.F.	49.5	2.5	15.5	29.0	42.0	5 15 15.70	3.54					
56	Bessel . . .	405	17.5	30.7	44.0	57.3	10.0	5 16 43.90	1.30	1 28.20	2.24			
57	Mars . . .	N.P.	5.0	18.2	31.2	44.5	57.2	5 18 31.22	4.99					
58	Bessel . . .	405	34.3	47.7	1.0	14.4	27.1	5 20 0.90	1.66	1 29.68	3.33			
59	Mars . . .	S.F	17.1	30.3	43.3	56.7	9.2	5 21 43.28	3.83					
60	Bessel . . .	405	45.5	58.5	11.5	25.0	37.7	5 23 11.64	1.61	1 28.36	2.22			
61	Mars . . .	N.P.	15.5	28.7	41.7	55.3	7.5	5 24 41.74	4.85					
62	Bessel . . .	405	44.8	58.0	11.3	25.2	37.5	5 26 11.36	1.60	1 29.62	3.25			
63	Mars . . .	S F.	39.0	52.2	5.0	18.2	31.2	5 28 5.12	3.61					
64	Bessel . . .	405	7.8	21.2	34.3	47.5	0.2	5 29 34.20	1.34	1 29.08	2.27			
65	Mars . . .	N.P.	51.2	4.5	17.6	31.2	44.0	5 31 17.70	4.67					
66	Bessel . . .	405	22.0	35.0	48.2	1.5	14.5	5 32 48.24	1.40	1 30.54	3.27			
67	Mars . . .	S.F.	51.5	4.5	17.8	31.2	44.0	5 34 17.80	3.72					
68	Bessel . . .	405	21.0	34.2	47.5	1.0	13.3	5 35 47.40	1.47	1 29.60	2.25			
69 *a*	Mars . . .	N.P.	51.5	4.7	17.9	31.3	40.0	5 37 17.88	4.73					
70	Bessel . . .	405	22.5	35.5	48.8	2.0	15.0	5 38 48.76	+1.56	—1 30.88	+3.17			

JANUARY 1, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
71 *f*	Mars . . .	S.F.	33.5	46.5	59.8	13.2	26.0	5 41 59.80	+3.83			28.142	74.5	58.3
72	Bessel . . .	405	3.2	16.5	29.6	43.2	56.0	5 43 29.70	1.64	—1 29.90	+2.19			
73 *g*	Mars . . .	N.P.	5.5	18.8	32.0	45.5	58.2	5 45 32.00	4.93			Ther. att. 69°.5		
74	Bessel . . .	405	36.8	50.0	3.2	16.5	29.5	5 47 3.20	1.75	1 31.20	3.18	Bar. red. to 32° F.		
75 *h*	Mars . . .	S.F.	27.2	40.5	53.6	7.0	19.7	5 48 53.60	3.98			28.031		
76	Bessel . . .	405	57.5	10.8	24.0	37.3	50.2	5 50 23.96	1.77	1 30.36	2.21			
77	Mars . . .	N.P.	37.0	50.2	3.3	16.9	29.5	5 52 3.38	5.03					
78	Bessel . . .	405	8.8	22.0	35.2	48.6	1.2	5 53 35.16	1.78	1 31.78	3.25			
79	Mars . . .	S.F.	59.1	12.5	25.5	38.8	51.5	5 55 25.48	4.05					
80	Bessel . . .	405	29.8	43.0	56.2	9.5	22.2	5 56 56.14	1.83	1 30.66	2.22			
81 *i*	Mars . . .	N.P.	3.8	17.0	30.2	43.5	56.2	5 58 30.14	5.09					
82	Bessel . . .	405	35.8	49.0	2.5	15.8	28.5	6 0 2.32	1.88	1 32.18	3.21			
83	Mars . .	S.F.	31.5	44.5	57.8	11.2	24.0	6 1 57.80	4.15					
84	Bessel . . .	405	2.5	16.0	29.0	42.4	55.2	6 3 29.02	1.96	1 31.22	2.19			
85	Mars . . .	N.P.	40.0	53.2	6.4	19.8	32.5	6 5 6.38	5.19					
86	Bessel . . .	405	12.5	25.8	39.0	52.2	5.2	6 6 38.94	1.98	1 32.56	3.21			
87	Mars . . .	S.F.	43.3	56.8	9.9	23.3	36.0	6 8 9.86	4.17					
88	Bessel . .	405	15.0	28.2	41.3	54.7	7.5	6 9 41.34	1.96	1 31.48	2.21			
89	Mars . . .	N.P.	20.5	33.7	46.8	0.3	12.8	6 12 46.82	5.18					
90	Bessel . . .	405	53.5	6.5	20.0	33.2	46.0	6 14 19.84	+1.95	—1 33.02	+3.23			

Remarks.

There being much flare and unsteadiness about the limbs of Mars, the earlier observations are only moderately good.

a Good measures.
b Unsteady.
c Blazing.
d When observing Mars on middle wire there was a momentary quivering as though an earthquake shook the instrument.
e Steady—good measures.
f Planet steady—good measures.
g Good. Indeed all these measures are excellent.
h Remarkably steady.
i Wonderfully steady.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	Twenty-three transits . .	4 51 37.52	—1 28.192	+3.298 . . .	=1 4.28
Mean S. F.	Twenty-two transits . .	4 51 49.01	—1 26.947	+2.269	=0 44.23

h. m.	s.
Correction for chronometer at 4 51	—19.33
Correction for chronometer at 4 51	—19.33

	h. m. s.
Santiago sid. time N. P.	4 51 18.19
Santiago sid. time S. F.	4 51 29.68
Interval	11.49

	″
Δ P. F. limbs in A. R. reduced to arc	18.67
Variation of A. R. in 11*s*.	+ 0.15
Observed P. F. diameter	18.82

	″
Δ N. S. limbs micr. in rev.	1.030 = 20.05
Variation of declination in 11*s*. . . .	— 0.00
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	17.85

h. m.	″
Δ ρ at 4 52	0.07

h. m.	″
Δ ρ at 4 52	0.05

JANUARY 2, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	50.5	3.5	16.8	30.8	43.0	3 11 16.92	+2.49			28.038	74.6	57.9
2	Bessel . . . 405	28.5	. .	54.5	8.2	21.0	3 13 54.76	1.53	—2 37.84	+0.96			
3	Mars . . . S.F.	19.0	32.5	45.3	58.8	11.3	3 15 45.38	1.68			Ther. att. 74°.4 Bar. red. to 32° F. 27.912		
4	Bessel . . . 405	. .	9.2	22.0	35.4	48.0	3 18 22.03	1.68	2 36.65	±0.00			
5	Mars . . . N.P.	34.4	47.5	0.7	14.2	26.9	3 21 0.74	2.94					
6	Bessel . . . 405	13.8	26.8	39.2	52.5	5.0	3 23 39.46	2.01	2 38.72	+0.93			
7	Mars . . . S.F.	1.5	15.0	28.2	41.5	54.3	3 46 28.10	2.99					
8	Bessel . . . 405	. .	53.5	6.5	20.0	32.8	3 49 6.58	2.99	2 38.48	±0.00			
9 *a*	Mars . . . N.P.	55.8	9.2	22.3	35.7	48.3	3 56 22.26	4.46					
10	Bessel . . . 405	36.5	49.5	2.8	16.0	28.7	3 59 2.70	3.59	2 40.44	+0.87			
11 *b*	Mars . . . S.F.	9.2	22.5	35.5	49.0	1.7	4 0 35.58	4.20					
12	Bessel . . . 405	49.0	1.7	15.0	28.2	41.0	4 3 14.98	4.19	2 39.40	0.01			
13	Mars . . . N.P.	43.4	56.5	9.7	22.8	35.7	4 5 9.62	1.88					
14	Bessel . . . 405	24.0	37.3	50.4	3.7	16.5	4 7 50.38	0.88	2 40.76	+1.00			
15 *c*	Mars . . . S.F.	55.4	8.9	22.2	35.3	48.0	4 10 21.96	0.94					
16	Bessel . . . 405	35.0	48.5	1.7	. .	27.5	4 13 1.42	1.01	2 39.46	—0.07			
17	Mars . . . N.P.	36.2	49.5	2.8	16.0	29.0	4 15 2.70	2.08					
18	Bessel . . . 405	. .	31.2	44.0	. .	10.0	4 17 44.06	1.10	2 41.36	+0.98			
19	Mars . . . S.F.	50.3	3.8	16.5	30.0	42.5	4 20 16.62	1.03					
20	Bessel . . . 405	31.0	44.0	57.2	10.5	23.2	4 22 57.18	1.03	2 40.56	±0.00			
21	Mars . . . N.P.	7.0	20.3	33.5	46.8	59.5	4 24 33.42	2.37					
22	Bessel . . . 405	49.0	2.2	15.3	28.8	41.3	4 27 15.32	1.41	2 41.90	+0.96			
23	Mars . . . S.F.	45.0	58.2	11.5	24.8	37.3	4 29 11.36	1.41					
24	Bessel . . . 405	25.7	39.0	52.3	5.7	18.2	4 31 52.18	1.55	2 40.82	—0.14			
25	Mars . . . N.P.	56.6	10.0	23.2	36.5	49.2	4 34 23.10	2.65					
26	Bessel . . . 405	39.5	52.7	5.5	19.2	31.5	4 37 5.68	1.77	2 42.58	+0.88			
27	Mars . . . S.F.	44.3	57.5	10.5	24.2	36.9	4 39 10.68	1.80					
28	Bessel . . . 405	26.0	39.0	52.0	5.5	18.2	4 41 52.14	1.80	2 41.46	±0.00			
29	Mars . . . N.P.	11.1	24.8	38.0	51.5	4.3	4 43 37.94	2.96					
30	Bessel . . . 405	54.8	8.0	21.0	34.4	47.2	4 46 21.08	1.96	2 43.14	+1.00			
31 *d*	Mars . . . S.F.	43.0	56.5	9.3	22.5	35.8	4 48 9.42	2.05					
32	Bessel . . . 405	25.0	38.3	51.3	5.0	17.8	4 50 51.48	2.15	2 42.06	—0.10			
33	Mars . . . N.P.	25.7	39.0	52.0	5.2	18.2	4 52 52.04	3.19					
34	Bessel . . . 405	. .	22.0	35.5	49.0	1.5	4 55 35.38	2.26	2 43.34	+0.93			
35	Mars . . . S.F.	8.5	21.8	35.2	48.3	1.1	4 57 34.98	2.24					
36	Bessel . . . 405	51.0	4.5	17.3	31.0	43.5	5 0 17.46	2.34	2 42.48	—0.10			
37	Mars . . . N.P.	35.7	49.0	2.2	15.5	28.2	5 2 2.12	3.43					
38	Bessel . . . 405	19.5	33.0	46.2	59.5	12.2	5 4 46.08	2.53	2 43.96	+0.90			
39	Mars . . . S.F.	38.8	52.0	5.2	18.5	31.3	5 7 5.16	2.53					
40	Bessel . . . 405	22.0	35.0	48.0	1.5	14.3	5 9 48.16	2.57	2 43.00	—0.04			
41	Mars . . . N.P.	17.8	31.0	44.0	57.7	10.5	5 11 44.20	3.65					
42	Bessel . . . 405	2.5	15.5	28.8	42.2	55.0	5 14 28.80	2.70	2 44.60	+0.95			
43	Mars . . . S.F.	46.8	0.0	13.1	26.6	39.3	5 17 13.16	2.87					
44	Bessel . . . 405	. .	. .	56.5	10.2	22.8	5 19 56.63	2.87	2 43.47	±0.00			
45 *e*	Mars . . . N.P.	27.0	40.2	53.5	6.8	19.5	5 21 53.40	4.04					
46	Bessel . . . 405	. .	25.0	38.2	51.5	4.2	5 24 38.11	+2.67	—2 44.71	+1.37			

JANUARY 2, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Mars . . . S.F.	58.3	11.5	24.7	38.0	51.0	5 29 24.70	+1.29			28.038	74.6	57.9
48	Bessel . . . 405	42.5	55.8	9.0	22.3	35.0	5 32 8.92	1.37	—2 44.22	—0.08			
49	Mars . . . N.P.	4.7	18.0	31.2	44.5	57.3	5 36 31.14	2.55			Ther. att. 74°.4 Bar. red. to 32° F 27.912		
50	Bessel . . . 405	50.5	4.0	17.0	30.5	43.2	5 39 17.04	1.72	2 45.90	+0.83			
51	Mars . . . S.F.	32.8	46.2	59.5	12.7	25.3	5 40 59.30	1.69					
52	Bessel . . . 405	17.5	31.5	44.0	57.5	10.5	5 43 44.20	1.87	2 44.90	—0.18			
53 *f*	Mars . . . N.P.	24.5	38.2	51.3	4.5	17.5	5 45 51.20	3.11					
54	Bessel . . . 405	11.3	24.5	37.5	50.0	3.5	5 48 37.36	2.39	2 46.16	+0.72			
55 *g*	Mars . . . S.F.	4.5	17.7	31.0	44.4	57.0	5 50 30.92	1.76					
56	Bessel . . . 405	50.0	3.0	16.0	29.5	42.2	5 53 16.14	2.00	2 45.22	—0.24			
57	Mars . . . N.P.	24.3	37.5	51.0	4.5	17.2	5 54 50.90	2.97					
58	Bessel . . . 405	11.5	24.8	37.8	51.4	4.0	5 57 37.90	2.09	2 47.00	+0.88			
59	Mars . . . S.F.	51.5	4.5	17.8	31.2	44.0	5 59 17.80	1.95					
60	Bessel . . . 405	37.5	50.5	3.6	17.2	30.0	6 2 3.76	2.15	2 45.96	—0.20			
61	Mars . . . N.P.	27.7	41.0	54.0	7.5	20.3	6 3 54.10	2.96					
62	Bessel . . . 405	15.0	28.2	41.3	54.7	7.5	6 6 41.34	2.18	2 47.24	+0.78			
63	Mars . . . S.F.	8.0	21.2	34.3	47.7	0.5	6 8 34.34	2.00					
64	Bessel . . . 405	54.3	7.5	20.5	34.0	46.7	6 11 20.60	2.24	2 46.26	—0.24			
65	Mars . . . N.P.	38.5	52.2	5.5	18.8	31.2	6 13 5.24	3.02					
66	Bessel . . . 405	26.7	40.0	53.0	6.5	19.5	6 15 53.14	2.22	2 47.90	+0.80			
67	Mars . . . S.F.	10.8	24.3	37.5	50.8	3.5	6 17 37.38	2.01					
68	Bessel . . . 405	57.6	11.0	24.2	37.5	50.3	6 20 24.12	2.29	2 46.74	—0.28			
69	Mars . . . N.P.	38.2	51.5	4.7	18.2	30.8	6 22 4.68	3.03					
70	Bessel . . . 405	26.5	40.0	53.2	6.5	19.5	6 24 53.14	2.32	2 48.46	+0.71			
71	Mars . . . S.F.	14.6	28.0	41.2	54.5	7.5	6 26 41.16	2.09					
72	Bessel . . . 405	2.2	15.5	28.5	42.0	55.0	6 29 28.64	+2.25	—2 47.48	—0.16			

Remarks.

An unfavorable night for observations, either because of much motion to the planet, and a flaring disc, or a partial obscuration of the comparing star by light cirri, that rendered measures doubtful under ordinary illumination.

a Micrometer recorded + 3.46 rev.
b Somewhat better than preceding.
c Recorded 21.2*s*. at wire C.
d Seen through haze.
e As the light of the east lamp went out just on observing Mars, it was removed, and not replaced until after observing the comparing star. The removal of its weight is shown in the measures.
f Good.
g The observations that follow are more reliable.

Results.

		h. m. s.
Mean N. P. . . .	Eighteen transits . .	4 56 27.54
Mean S. F. . . .	Eighteen transits . .	5 2 30.04

m. s.	Rev.	′ ″
— 2 43.667	+ 0.914	= 0 17.81
— 2 42.701	— 0.102	= 0 1.99

	h. m.	s.
Correction for chronometer at	4 56	— 20.44
Correction for chronometer at	5 2	— 20.44

	h. m. s.
Santiago sid. time N. P.	4 56 7.10
Santiago sid. time S. F.	5 2 9.60
Interval	6 2.50

	″
Δ P. F. limbs in A. R. reduced to arc . . .	14.49
Variation of A. R. in 6*m*. 2*s*.	+ 4.56
Observed P. F. diameter	19.05

	″
Δ N. S. limbs micr. in rev. . . . . . . 1.016 =	19.80
Variation of declination in 6*m*. 2*s*. . .	— 0.20
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	17.40

h. m.	″
Δ ρ at 4 57	0.02
Δ ρ at 5 3	0.00

JANUARY 4, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α	Δ δ	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	28.0	41.3	54.7	8.0	20.5	3 48 54.50	+3.31			28.110	70.0	55.4
2	Bessel . . . 523	. .	47.3	0.5	13.5	26.5	3 50 0.33	5.01	−1 5.83	−1.70			
3	Mars . . . S.F.	17.0	30.5	43.5	57.0	9.8	3 52 43.56	0.65			Ther. att. 70°.5		
4	Bessel . . . 523	. .	35.3	48.5	1.5	14.5	3 53 48.33	3.21	1 4.77	2.56	Bar. red. to 32° F. 27.996		
5	Mars . . . N.P.	48.4	1.5	14.8	28.0	41.2	3 56 14.78	1.60					
6	Bessel . . . 523	. .	8.0	21.2	34.5	47.2	3 57 21.11	3.33	1 6.22	1.73			
7	Mars . . . S.F.	31.2	44.5	58.0	11.3	24.2	3 58 57.85	0.32					
8	Bessel . . . 523	36.5	49.5	2.8	16.5	29.0	4 0 2.86	2.93	1 5.01	2.61			
9	Mars . . . N.P.	23.2	36.5	49.7	3.0	15.8	4 1 49.64	1.41					
10	Bessel . . . 523	31.0	44.0	56.5	9.5	22.3	4 2 56.66	3.05	1 7.02	1.64			
11	Mars . . S.F.	18.8	32.0	45.2	58.8	11.2	4 4 45.20	0.97					
12	Bessel . . . 523	25.0	37.5	50.5	4.2	17.0	4 5 50.80	3.67	1 5.60	2.70			
13	Mars . . . N.P.	12.0	25.3	38.5	51.8	4.5	4 7 38.42	1.83					
14	Bessel . . . 523	19.5	32.2	45.5	58.8	11.5	4 8 45.50	3.60	1 7.08	1.77			
15 *a*	Mars . . . S.F.	17.2	. .	43.5	57.2	9.7	4 12 43.42	0.78					
16	Bessel . . . 523	23.8	36.5	49.5	3.0	15.5	4 13 49.66	3.49	1 6.24	2.71			
17	Mars . . . N.P.	41.4	54.5	7.8	21.2	34.0	4 16 7.78	1.94					
18	Bessel . . . 523	48.8	2.2	15.2	28.5	41.3	4 17 15.20	3.62	1 7.42	1.68			
19	Mars . . . S.F.	48.0	1.2	14.3	27.7	40.5	4 20 14.34	1.04					
20	Bessel . . . 523	54.3	7.5	20.5	34.0	46.8	4 21 20.62	3.68	1 6.28	2.64			
21	Mars . . . N.P.	42.4	55.5	8.5	22.0	34.8	4 23 8.64	1.91					
22	Bessel . . . 523	50.0	3.2	16.5	29.8	42.3	4 24 16.36	3.58	1 7.72	1.67			
23	Mars . . . S.F.	47.0	0.2	13.4	26.8	39.8	4 26 13.44	1.02					
24	Bessel . . . 523	53.5	6.5	19.6	33.0	45.5	4 27 19.62	3.72	1 6.18	2.70			
25	Mars . . . N.P.	57.7	11.0	24.2	37.5	50.5	4 29 24.18	2.49					
26	Bessel . . . 523	6.0	19.2	32.2	45.5	58.2	4 30 32.22	4.20	1 8.04	1.71			
27	Mars . . . S.F.	38.5	52.2	5.0	18.8	31.2	4 34 5.14	1.50					
28	Bessel . . . 523	45.5	59.0	12.2	25.5	38.2	4 35 12.08	4.20	1 6.94	2.70			
29	Mars . . . N.P.	36.5	50.2	3.2	16.5	29.3	4 37 3.14	1.58					
30	Bessel . . . 523	44.0	57.0	10.2	23.5	36.2	4 38 10.18	3.34	1 7.04	1.76			
31	Mars . . . S.F.	6.8	20.2	33.2	46.6	59.5	4 40 33.22	1.59					
32 *b*	Bessel . . . 523	14.2	27.2	40.4	54.0	6.5	4 41 40.46	4.33	1 7.24	2.74			
33	Mars . . . N.P.	30.5	43.5	57.0	10.3	22.8	4 44 56.82	1.53					
34	Bessel . . . 523	39.2	52.5	5.9	19.0	31.7	4 46 5.66	3.21	1 8.84	1.68			
35	Mars . . . S.F.	11.0	24.3	37.5	50.5	3.5	4 48 37.36	0.61					
36	Bessel . . . 523	. .	31.5	45.0	. .	11.2	4 49 44.89	3.32	1 7.53	2.71			
37 *c*	Mars . . . N.P.	42.5	55.5	9.0	22.3	35.0	4 52 8.86	1.60					
38	Bessel . . . 523	51.2	5.0	17.8	31.3	43.8	4 53 17.82	3.34	1 8.96	1.74			
39	Mars . . . S.F.	39.2	52.5	5.5	19.0	31.7	4 55 5.58	0.71					
40	Bessel . . . 523	47.5	0.5	13.5	27.0	39.5	4 56 13.60	3.47	1 8.02	2.76			
41 *c*	Mars . . . N.P.	10.1	23.4	36.5	50.0	2.5	4 58 36.50	1.74					
42	Bessel . . . 523	19.8	33.0	46.5	59.5	12.5	4 59 46.26	3.49	1 9.76	1.75			
43	Mars . . . S.F.	33.2	46.3	59.5	12.8	25.5	5 1 59.46	0.84					
44	Bessel . . . 523	41.6	55.2	8.0	21.5	34.0	5 3 8.06	3.59	1 8.60	2.75			
45	Mars . . . N.P.	27.5	40.8	53.8	7.5	20.2	5 4 53.96	1.87					
46	Bessel . . . 523	37.3	50.7	4.0	17.5	30.2	5 6 3.94	+3.66	−1 9.98	−1.79			

JANUARY 4, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47 *d*	Mars . . .	S.F.	49.8	3.0	16.2	29.7	42.5	5 8 16.24	+0.90			28.110	70.0	55.4
48	Bessel . . .	523	58.5	11.5	25.5	39.0	51.5	5 9 25.20	3.80	—1 8.96	—2.90			
49	Mars . . .	N.P.	45.7	59.0	12.2	25.5	38.3	5 12 12.14	1.91			Ther. att. 74°.4 Bar. red. to 32° F. 27.912		
50	Bessel . . .	523	56.0	9.5	22.5	36.0	48.0	5 13 22.40	3.70	1 10.26	1.79			
51	Mars . . .	S.F.	43.7	56.8	10.2	23.5	36.3	5 15 10.10	0.98					
52	Bessel . . .	523	52.5	6.2	19.5	32.5	45.2	5 16 19.18	3.87	1 9.08	2.89			
53 *e*	Mars . . .	N.P.	51.8	4.9	18.2	31.2	44.2	5 18 18.06	2.14					
54 *f*	Bessel . . .	523	2.5	15.2	28.5	42.3	54.7	5 18 28.64	3.94	1 10.58	1.80			
55	Mars . . .	S.F.	7.0	21.5	34.5	47.8	0.5	5 21 34.26	1.12					
56	Bessel . . .	523	. .	30.8	44.0	57.2	10.0	5 22 43.88	4.03	1 9.62	2.91			
57	Mars . . .	N.P.	1.0	14.5	27.8	41.3	53.5	5 24 27.62	2.19					
58	Bessel . . .	523	. .	25.3	38.5	52.0	4.7	5 25 38.51	4.02	1 10.89	1.83			
59	Mars . . .	S.F.	55.3	8.7	21.7	35.2	47.9	5 27 21.76	1.22					
60	Bessel . . .	523	. .	18.8	32.0	45.5	58.2	5 28 32.01	4.03	1 10.25	2.81			
61	Mars . . .	N.P.	24.4	37.8	51.0	4.2	17.0	5 30 50.88	2.29					
62	Bessel . . .	523	35.5	48.5	2.2	16.0	28.8	5 32 2.20	4.14	1 11.32	1.85			
63	Mars . . .	S.F.	51.4	5.0	18.2	31.5	43.7	5 34 17.96	1.40					
64	Bessel . . .	523	. .	15.0	28.2	41.5	54.5	5 35 28.18	4.26	1 10.22	2.86			
65 *g*	Mars . . .	N.P.	8.2	21.5	34.7	48.2	1.0	5 38 34.72	2.46					
66	Bessel . . .	523	20.0	33.0	46.2	0.0	12.5	5 39 46.34	4.25	1 11.62	1.79			
67	Mars . . .	S.F.	3.7	17.2	30.2	43.5	56.5	5 41 30.22	1.49					
68	Bessel . . .	523	14.5	27.5	40.8	54.2	6.8	5 42 40.76	4.33	1 10.54	2.84			
69	Mars . .	N.P.	44.6	58.1	11.0	24.5	37.2	5 44 11.08	2.46					
70	Bessel . . .	523	56.5	9.7	23.0	36.5	49.2	5 45 22.98	4.37	1 11.90	1.91			
71	Mars . . .	S.F.	7.5	20.8	34.0	47.5	0.2	5 47 34.00	1.60					
72	Bessel . . .	523	18.5	31.5	45.0	58.5	11.2	5 48 44.94	4.49	1 10.94	2.89			
73	Mars . . .	N.P.	4.0	17.5	30.5	43.8	56.5	5 50 30.46	2.60					
74	Bessel . . .	523	16.2	29.4	42.5	56.2	8.8	5 51 42.62	4.38	1 12.26	1.78			
75 *d*	Mars . . .	S.F.	10.6	24.2	37.5	51.0	35.0	5 53 37.66	1.54					
76	Bessel . . .	523	22.0	35.5	47.5	1.0	13.5	5 54 47.90	4.47	1 10.24	2.93			
77	Mars . . .	N.P.	30.0	43.2	56.3	9.8	22.5	5 56 56.36	2.43					
78	Bessel . . .	523	42.5	55.5	8.5	22.5	35.2	5 58 8.84	4.33	1 12.48	1.90			
79 *h*	Mars . .	S.F.	21.5	35.0	48.2	1.5	14.2	5 59 48.08	1.65					
80	Bessel . . .	523	33.2	46.5	0.0	13.3	26.0	6 0 59.80	4.52	1 11.72	2.87			
81	Mars . . .	N.P.	43.0	56.5	9.5	22.8	35.7	6 3 9.50	2.47					
82	Bessel . . .	523	56.0	9.2	22.2	35.7	48.4	6 4 22.30	4.50	1 12.80	2.03			
83	Mars . . .	S.F.	40.5	53.6	7.0	20.2	33.2	6 6 6.90	1.62					
84	Bessel . . .	523	51.7	5.5	18.7	32.2	45.0	6 7 18.62	4.49	1 11.72	2.87			
85	Mars . . .	N.P.	30.4	43.5	56.7	10.2	22.9	6 8 56.74	2.42					
86	Bessel . . .	523	43.5	57.2	10.2	23.7	36.5	6 10 10.22	4.50	1 13.48	2.08			
87	Mars . . .	S.F.	28.2	41.2	54.7	8.0	20.8	6 11 54.58	1.58					
88	Bessel . . .	523	40.0	53.4	6.5	19.5	32.5	6 13 6.38	4.48	1 11.80	2.90			
89 *i*	Mars . . .	N.P.	1.5	15.0	28.3	41.5	54.5	6 15 28.16	2.52					
90	Bessel . . .	523	15.5	28.5	42.0	55.5	7.8	6 16 41.86	4.48	1 13.70	1.96			
91 *i*	Mars . . .	S.F.	19.5	32.7	46.0	59.3	12.2	6 18 45.94	1.83					
92	Bessel . . .	523	31.8	45.5	58.5	12.0	25.0	6 19 58.56	+4.76	—1 12.62	—2.93			

JANUARY 4, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
93	Mars . . . N.P.	59.5	12.7	26.0	39.5	52.3	6 21 26.00	+2.58			28.110	70.0	55.4
94	Bessel . . . 523	13.2	26.5	39.8	53.3	6.0	6 22 39.76	4.54	—1 13.76	—1.96			
95	Mars . . . S.F.	13.2	26.5	39.5	53.0	5.8	6 24 39.60	1.58			Ther. att. 74.°4		
96	Bessel . . . 523	25.0	38.8	52.0	5.5	18.2	6 25 51.90	4.57	1 12.30	2.99	Bar. red. to 32° F. 27.912		
97	Mars . . . N.P.	24.5	38.3	51.8	5.0	17.7	6 27 51.46	2.57					
98	Bessel . . . 523	39.0	52.8	6.0	19.3	32.0	6 29 5.82	4.48	1 14.36	1.91			
99	Mars . . . S.F.	13.5	26.8	40.0	53.5	6.3	6 30 40.02	1.46					
100	Bessel . . . 523	26.7	40.0	53.2	6.8	19.5	6 31 53.24	+4.43	—1 13.22	—2.97			

Remarks.

The night was not favorable for observations. Frequent cold blasts of wind, following a very hot day, generated currents in the strata of air. There was much snow on the mountains yesterday evening and last night—partially the cause, perhaps, of the present atmospheric condition.

I do not think the comparing star can exceed the 9.10 magnitude, though stated by Bessel as 8.9.

a More steady.
b Recorded 7.5*s*. at wire E.
c Both objects very unsteady.
d Very unsteady.
e Recorded 9*s*. at wire B.
f Recorded 55.7*s*. at wire E.
g Steady.
h Tolerably steady.
i Good observations.

Results.

		h. m. s.
Mean N. P. . Twenty-five transits . .		5 10 6.81
Mean S. F. . Twenty-five transits . .		5 13 29.43
	h. m.	s.
Correction for chronometer at	5 10 . . .	—22.54
Correction for chronometer at	5 13 . . .	—22.54
		h. m.
Δ P. F. limbs in A. R. reduced to arc . . .		16.60
Variation of A. R. in 3*m*. 23*s*.		+ 2.36
Observed P. F. diameter		18.96
	h. m.	″
Δ ρ at	5 10	0.04

m. s.	Rev.	′ ″
— 1 10.133	— 1.808	= 0 35.24
— 1 9.026	— 2.806	= 0 54.69

	h. m. s.
Santiago sid. time for N. P.	5 9 44.27
Santiago sid. time for S. F.	5 13 6.88
Interval	3 22.61
	″
Δ N. S. limbs micr. in rev.	0.998 = 19.45
Variation of declination in 3*m*. 22*s*. . .	— 0.13
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	17.12
h. m.	″
Δ ρ at 5 14	0.06

JANUARY 5, 1850.

The night of the 5th, until the planet had passed the meridian, was cloudy.

JANUARY 6, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	19.5	32.5	45.7	59.2	11.8	3 41 45.74	+2.52			28.178	67.5	56.7
2	Bessel . . . 523	33.2	46.4	59.5	13.0	25.5	3 44 59.52	10.04	—3 13.78	—7.52			
3	Mars . . . S.F.	52.5	5.8	19.0	32.4	45.3	3 48 19.00	1.48			Ther. att. 68°.0		
4	Bessel . . . 523	5.5	18.8	31.8	45.2	58.0	3 51 31.86	10.04	3 12.86	8.56	Bar. red. to 32° F. 28.071		
5	Mars . . . N.P.	51.6	5.0	18.0	31.5	44.3	3 53 18.08	3.03					
6	Bessel . . . 523	. .	19.2	32.2	. .	58.2	3 56 32.19	+10.53	—3 14.11	—7.50			

JANUARY 6, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
7	Mars . . . S.F.	58.0	11.2	24.2	37.5	50.2	3 59 24.22	+1.78			28.178	67.5	56.7
8	Bessel . . . 523	11.2	24.2	37.5	51.0	3.7	4 2 37.52	10.31	—3 13.30	—8.53			
9	Mars . . . N.P.	52.0	5.5	18.6	32.0	44.5	4 5 18.52	2.97			Ther. att. 68°.0 Bar. red. to 32° F. 28.071		
10	Bessel . . . 523	7.0	20.3	33.5	47.0	59.2	4 8 33.40	10.59	3 14.88	7.62			
11	Mars . . . S.F.	58.6	12.0	25.2	38.5	51.2	4 19 25.10	1.01					
12	Bessel . . . 523	13.0	26.0	39.2	52.4	5.1	4 22 39.14	9.60	3 14.04	8.59			
13	Mars . . . N.P.	52.0	6.0	19.0	32.5	45.2	4 24 18.94	1.33					
14	Bessel . . . 523	8.2	21.2	34.5	48.0	0.8	4 27 34.54	9.05	3 15.60	7.72			
15 *a*	Mars . . . S.F.	58.0	12.0	25.0	38.5	51.2	4 29 24.94	0.58					
16	Bessel . . . 523	12.8	25.7	39.0	52.5	5.2	4 32 39.04	9.33	3 14.10	8.75			
17	Mars . . . N.P.	13.3	26.5	40.0	53.0	5.7	4 34 39.90	1.29					
18	Bessel . . . 523	. .	. .	55.5	9.2	22.0	4 37 55.69	9.01	3 15.79	7.72			
19	Mars . . . S.F.	52.0	5.5	18.5	32.0	44.7	4 40 18.54	0.46					
20	Bessel . . . 523	. .	20.5	33.5	47.0	59.5	4 43 33.51	9.24	3 14.97	8.78			
21	Mars . . . N.P.	48.2	1.5	14.5	28.0	40.8	4 45 14.60	1.69					
22	Bessel . . . 523	4.5	18.0	31.2	44.7	57.5	4 48 31.18	9.47	3 16.58	7.78			
23	Mars . . . S.F.	7.5	21.0	34.0	47.4	0.1	4 50 34.00	0.76					
24	Bessel . . . 523	24.0	36.8	49.5	3.0	15.5	4 53 49.76	9.46	3 15.76	8.70			
25	Mars . . . N.P.	25.5	39.0	52.0	5.5	18.2	5 39 52.02	1.08					
26	Bessel . . . 523	44.5	58.0	10.8	24.2	37.0	5 43 10.90	8.85	3 18.88	7.77			
27 *b*	Mars . . . S.F.	47.3	0.5	13.5	27.2	39.5	5 45 13.60	1.20					
28	Bessel . . . 523	57.0	10.5	23.5	37.0	49.7	5 49 23.54	10.12	4 9.94	8.92			
29	Mars . . . N.P.	1.5	14.5	27.5	41.0	53.8	5 50 27.66	2.11					
30	Bessel . . . 523	21.2	34.0	47.2	0.5	13.2	5 53 47.22	9.99	3 19.56	7.88			
31	Mars . . . S.F.	8.0	21.3	34.5	48.0	0.7	5 55 34.50	0.81					
32	Bessel . . . 523	27.0	40.2	53.2	16.8	19.3	5 58 53.30	9.58	3 18.80	8.77			
33	Mars . . . N.P.	58.0	11.5	24.5	37.8	50.5	6 0 24.46	1.93					
34	Bessel . . . 523	18.2	31.5	44.5	58.0	10.7	6 3 44.58	9.77	3 20.12	7.84			
35	Mars . . . S.F.	15.0	28.5	41.5	54.8	7.5	6 5 41.46	0.94					
36	Bessel . . . 523	34.3	47.5	0.5	14.0	26.8	6 9 0.62	+9.81	—3 19.16	—8.87			

Remarks.

Not a very favorable night for observations.
a Very unsteady.

b A slip of the instrument in A. R. after observing Mars. Rejected.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	First six transits	4 14 5.96	— 3 15.123	— 7.643	= 2 28.96
Mean S. F.	First six transits	4 21 14.29	3 14.172	8.651	2 48.61
Mean N. P.	Next three transits	5 50 14.71	3 19.520	7.830	2 32.61
Mean S. F.	Next two transits	6 0 37.98	— 3 18.980	— 8.820	= 2 51.90

	h. m.	h. m. s.
Correction for chronometer at	4 14	— 28.63
Correction for chronometer at	4 21	— 28.64
Santiago sid. time N. P.		4 13 37.33
Santiago sid. time S. F.		4 20 45.65
Interval		7 8.32

	h. m.	h. m. s.
Correction for chronometer at	5 50	— 28.82
Correction for chronometer at	6 1	— 28.84
Santiago sid. time N. P.		5 49 45.91
Santiago sid. time S. F.		6 0 9.14
Interval		10 23.23

7°

JANUARY 6, 1850—Continued.

Results—Continued.

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	14.26	Δ N. S. limbs micr. in rev. . . . . . 1.008 =	19.65
Variation of A. R. in 7*m.* 8*s.*	+ 4.48	Variation of declination in 7*m.* 8*s.* . .	— 0.29
Observed P. F. diameter	18.74	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	17.16
	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	8.10	Δ N. S. limbs micr. in rev. . . . . . 0.990 =	19.29
Variation of A. R. in 10*m.* 23*s.*	+ 6.51	Variation of declination in 10*m.* 23*s.* .	— 0.44
Observed P. F. diameter	14.61	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	16.65
h. m.	″	h. m.	″
Δ ρ at 4 15	0.16	Δ ρ at 5 51	0.17
Δ ρ at 4 22	0.19	Δ ρ at 6 2	0.19

JANUARY 7, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . .	N.P.	47.5	0.7	13.8	27.2	39.9	3 39 13.82	+ 0.98			28.163	71.4	56.8
2	Bessel . . .	523	0.0	13.0	26.0	39.5	52.5	3 43 26.20	11.66	—4 12.38	—10.68			
3	Mars . . .	S.F.	19.0	32.5	45.5	58.8	11.5	3 46 45.46	1.71			Ther. att. 69°.5		
4	Bessel . . .	523	30.5	43.5	56.5	10.0	23.0	3 50 56.70	13.52	4 11.24	11.81	Bar. red. to 32° F.		
5	Mars . . .	N.P.	53.3	6.5	19.8	33.0	45.7	3 55 19.66	2.19			28.052		
6	Bessel . . .	523	5.3	19.5	32.5	46.0	58.7	3 59 32.40	12.99	4 12.74	10.80			
7	Mars . . .	S.F.	6.0	19.5	32.7	46.0	58.8	4 1 32.60	2.00					
8	Bessel . . .	523	17.8	31.0	44.5	58.2	11.0	4 5 44.50	13.75	4 11.90	11.75			
9	Mars . . .	N.P	32.5	45.2	58.0	11.5	24.2	4 7 58.28	0.84					
10	Bessel . . .	523	45.5	59.0	12.0	25.3	38.0	4 12 11.96	11.58	4 13.68	10.74			
11	Mars . . .	S.F.	42.2	55.5	8.5	22.0	34.7	4 15 8.58	1.49					
12	Bessel . . .	523	54.6	8.2	21.5	35.0	47.5	4 19 21.36	13.27	4 12.78	11.78			
13	Mars . . .	N.P.	37.2	50.5	3.7	17.0	29.7	4 22 3.62	2.82					
14	Bessel . . .	523	. .	5.0	18.0	31.5	44.2	4 26 18.06	13.59	4 14.44	10.77			
15	Mars . . .	S.F	37.0	50.2	3.5	16.8	29.5	4 28 3.40	1.98					
16	Bessel . . .	523	50.3	3.5	16.8	30.2	43.0	4 32 16.76	13.72	4 13.36	11.74			
17	Mars . . .	N.P.	56.7	9.8	22.8	36.2	49.0	4 34 22.90	3.12					
18	Bessel . . .	523	11.5	24.5	37.7	51.2	43.0	4 38 37.58	13.91	4 14.68	10.79			
19	Mars . . .	S.F.	28.5	41.5	54.7	8.1	21.0	4 40 54.76	2.43					
20	Bessel . . .	523	42.0	55.5	8.5	22.0	34.8	4 45 8.56	14.23	4 13.80	11.80			
21	Mars . . .	N.P.	25.5	38 5	51.5	5.2	17.8	4 48 51.70	1.81					
22	Bessel . . .	523	. .	53.5	6.7	19.8	32.5	4 53 6.51	12.63	4 14.81	10.82			
23	Mars . . .	S.F.	39.3	52.5	5.7	19.0	31.4	4 55 5.58	0.73					
24	Bessel . . .	523	53.5	7.0	20.0	33.5	46.0	4 59 20.00	12.59	4 14.42	11.86			
25 *a*	Mars . . .	N.P	46.3	59.5	12.7	26.2	38.8	5 1 12.70	1.73					
26	Bessel . . .	523	2.0	15.0	28.0	42.0	54.5	5 5 28.30	12.51	4 15.60	10.78			
27 *b*	Mars . . .	S.F.	11 3	25.0	38.2	51.5	4.2	5 7 38.04	0.86					
28	Bessel . . .	523	26.5	39.5	53.0	6.5	19.2	5 11 52.94	12.73	4 14.90	11.87			
29	Mars . . .	N P.	25.8	39.0	52.2	5.5	18.3	5 13 52.16	1.78					
30	Bessel . . .	523	41.0	54.2	7.5	20.5	33.5	5 18 7.34	12.72	4 15.18	10.94			
31	Mars . . .	S.F.	36.5	49.8	2.8	16.2	29.0	5 20 2.86	0.92					
32	Bessel . .	523	51.8	5.0	18.5	31.8	44.5	5 24 18.32	13.00	4 15.46	12.08			
33	Mars . . .	N.P.	26.0	39.5	52.7	6.0	18.8	5 25 52.60	2.14					
34	Bessel . . .	523	43.5	56.8	10.0	23.5	36.2	5 30 10.00	+13.00	—4 17.40	—10.46			

JANUARY 7, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
35 *c*	Mars . . . S.F.	29.5	42.8	56.0	9.3	22.2	5 31 55.96	+1.23			28.163	71.4	56.8
36	Bessel . . . 523	45.8	59.0	12.0	. .	38.5	5 36 12.18	13.15	—4 16.22	—11.92			
37	Mars . . . N.P.	8.3	21.6	34.5	48.2	1.0	5 38 34.72	2.25			Ther. att. 69°.5		
38	Bessel . . . 523	26.0	39.5	52.5	6.0	18.8	5 42 52.56	13.13	4 17.84	10.88	Bar. red. to 32° F.		
39	Mars . . . S.F.	48.3	1.5	14.5	28.2	41.0	5 48 14.70	1.39			28.052		
40	Bessel . . . 523	6.0	19.0	. .	45.5	58.0	5 52 32.14	13.27	4 17.44	11.88			
41 *c*	Mars . . . N.P.	57.2	10.2	23.3	37.0	49.7	5 54 23.48	2.52					
42	Bessel . . . 523	15.8	28.8	42.0	55.5	8.5	5 58 42.12	13.66	4 18.64	11.14			
43	Mars . . . S.F.	11.0	24.5	37.8	51.0	3.7	6 0 37.60	1.53					
44	Bessel . . . 523	29.0	42.3	55.2	9.0	21.5	6 4 55.40	13.55	4 17.80	12.02			
45	Mars . . . N.P.	5.5	18.5	31.8	45.3	58.0	6 6 31.82	2.56					
46	Bessel . . . 523	24.5	37.8	51.0	4.5	17.2	6 10 51.00	13.53	4 19.18	10.97			
47	Mars . . . S.F.	48.0	1.5	14.5	27.8	40.5	6 13 14.46	1.55					
48	Bessel . . . 523	6.4	19.5	32.5	46.0	58.5	6 17 32.58	13.54	4 18.12	11.99			
49	Mars . . . N.P.	10.3	23.5	36.5	50.2	3.0	6 19 36.70	2.63					
50	Bessel . . . 523	30.3	43.5	56.5	10.0	22.5	6 23 56.56	13.62	4 19.86	10.99			
51 *d*	Mars . . . S.F.	12.5	25.5	38.5	52.0	4.6	6 25 38.62	1.61					
52	Bessel . . . 523	31.0	44.0	57.0	10.5	23.3	6 29 57.16	13.61	4 18.54	12.00			
53 *d*	Mars . . . N.P.	33.0	46.0	59.5	12.8	25.5	6 31 59.36	2.62					
54	Bessel . . . 523	53.5	6.5	19.8	33.2	46.0	6 36 19.80	+13.74	—4 20.44	—11.12			

Remarks.

Observations during the night extremely variable in accuracy or value, owing to frequent changes in atmospheric conditions.

a Blazing and unsteady.
b Very unsteady.
c Steady.
d Good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Fourteen transits . .	5 7 8.11	—4 16.183 . . .	—10.848	=3 31.03
Mean S. F. . . .	Thirteen transits . .	5 7 19.31	—4 15.075 . . .	—11.885	=3 51.24

	h. m.	s.
Correction for chronometer at	5 7	—31.67
Correction for chronometer at	5 7	—31.67

	h. m. s.
Santiago sid. time N. P.	5 6 36.44
Santiago sid. time S. F.	5 6 47.64
Interval	11.20

	″
Δ P. F. limbs in A. R. reduced to arc . . .	16.62
Variation of A. R. in 11s.	+ 0.10
Observed P. F. diameter	16.72

	″
Δ N. S. limbs micr. in rev. . . . . . 1.037 =	20.21
Variation of declination in 11s. . . .	— 0.00
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	18.01

h. m.	″	h. m.	″
Δ ρ at 5 9	0.23	Δ ρ at 5 9	0.25

JANUARY 8, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	50.0	3.2	16.5	29.5	42.5	4 1 16.34	+1.33			28.151	72.2	56.6
2	Bessel . . . 523	59.0	12.0	25.0	38.5	52.2	4 6 25.34	15.14	−5 9.00	−13.81			
3	Mars . . . S.F.	47.8	1.3	14.5	27.8	40.5	4 9 14.38	0.53			Ther. att. 70°.5 Bar. red. to 32° F. 28.039		
4	Bessel . . . 523	55.5	9.2	22.2	36.0	48.5	4 14 22.28	15.48	5 7.90	14.95			
5	Mars . . . N.P.	46.8	0.0	13.3	26.5	39.2	4 16 13.16	1.81					
6	Bessel . . . 523	56.0	9.2	22.5	36.0	48.5	4 21 22.44	15.79	5 9.28	13.98			
7	Mars . . . S.F.	52.5	5.5	18.5	32.3	45.0	4 23 18.76	1.04					
8	Bessel . . . 523	1.0	14.0	27.0	40.0	53.2	4 28 27.04	16.00	5 8.28	14.96			
9	Mars . . . N.P.	38.5	52.0	5.0	18.5	32.5	4 31 5.30	2.17					
10	Bessel . . . 523	. .	2.0	15.2	28.5	41.2	4 36 15.01	16.18	5 9.71	14.01			
11	Mars . . . S.F.	23.7	37.2	50.8	3.5	16.2	4 37 50.28	1.17					
12	Bessel . . . 523	. .	46.3	59.3	12.7	25.5	4 42 59.33	16.18	5 8.05	15.01			
13 *a*	Mars . . . N.P.	48.2	1.3	14.5	27.8	40.5	4 45 14.46	2.46					
14	Bessel . . . 523	59.0	12.2	25.2	38.8	51.5	4 50 25.34	16.42	5 10.88	13.96			
15	Mars . . . S.F.	53.7	6.8	20.0	33.4	46.3	4 52 20.04	1.73					
16	Bessel . . . 523	3.0	16.5	29.5	43.0	55.8	4 57 29.56	16.80	5 9.52	15.07			
17	Mars . . . N.P.	50.6	3.5	16.5	30.2	42.8	5 0 16.72	2.26					
18	Bessel . . . 523	. .	14.5	27.5	40.0	53.5	5 5 27.26	16.43	5 10.54	14.17			
19	Mars . . . S.F.	10.0	23.2	36.5	49.8	2.5	5 7 36.40	1.74					
20	Bessel . . . 523	19.8	33.2	46.2	59.7	12.5	5 12 46.28	16.80	5 9.88	15.06			
21	Mars . . . N.P.	24.5	37.7	51.3	4.3	17.0	5 14 50.96	1.51					
22	Bessel . . . 523	35.8	49.0	2.2	15.8	28.5	5 20 2.26	15.55	5 11.30	14.04			
23	Mars . . . S.F.	37.5	50.5	4.0	17.5	30.2	5 23 3.94	0.39					
24	Bessel . . . 523	49.3	2.5	16.0	29.5	42.2	5 28 15.90	15.60	5 11.96	15.21			
25	Mars . . . N.P.	36.2	49.4	2.5	15.8	28.5	5 31 2.48	1.53					
26	Bessel . . . 523	48.5	2.0	15.0	28.5	41.2	5 36 15.04	15.74	5 12.56	14.21			
27	Mars . . . S.F.	31.0	44.5	57.5	10.9	23.5	5 37 57.48	0.61					
28	Bessel . . . 523	42.7	56.0	9.0	22.5	35.2	5 43 9.08	15.82	5 11.60	15.21			
29	Mars . . . N.P.	36.0	49.3	2.5	15.8	28.4	5 45 2.40	1.72					
30	Bessel . . . 523	. .	2.0	16.0	29.5	42.3	5 50 15.83	15.75	5 13.43	14.03			
31 *b*	Mars . . . S.F.	34.5	47.5	1.0	14.2	27.0	5 52 0.84	0.68					
32	Bessel . . . 523	46.8	0.0	13.3	26.5	39.5	5 57 13.22	15.82	5 12.38	15.14			
33 *c*	Mars . . . N.P.	25.5	39.5	52.5	5.5	18.5	6 6 52.30	1.78					
34	Bessel . . . 523	40.5	53.2	6.5	20.2	33.0	6 12 6.68	15.94	5 14.38	14.16			
35	Mars . . . S.F.	4.5	17.8	30.8	44.2	57.0	6 14 30.36	0.76					
36	Bessel . . . 523	17.5	31.0	44.2	57.5	10.2	6 19 44.08	15.90	5 13.22	15.14			
37	Mars . . . N.P.	8.3	21.3	34.8	48.3	1.2	6 21 34.78	1.72					
38	Bessel . . . 523	23.5	36.5	49.8	3.0	16.0	6 26 49.76	16.00	5 14.98	14.28			
39	Mars . . . S.F.	13.0	26.2	39.5	52.5	5.3	6 28 39.30	0.63					
40	Bessel . . . 523	27.0	40.2	53.2	6.5	19.5	6 33 53.28	+15.89	−5 13.98	−15.26			

Remarks.

The definition being ordinarily good, and motion of the planet steady, this may be regarded a very fair night for observations. The star cannot exceed the 10th magnitude.

a Good measures.

b Blazing and very unsteady.

c Recorded 10.0s. at wire E.

JANUARY 8, 1850—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	Ten transits	5 9 20.89	— 5 11.606	— 14.065	= 4 34.13
Mean S. F.	Ten transits	5 16 39.23	— 5 10.677	— 15.101	= 4 54.32

	s.		h. m. s.
Correction for chronometer at 5 h. 9 m.	— 34.58	Santiago sid. time N. P.	5 8 46.31
Correction for chronometer at 5 h. 17 m.	— 34.60	Santiago sid. time S. F.	5 16 4.63
		Interval	7 18.32

	″		″
Δ P. F. limbs in A. R. reduced to arc	13.93	Δ N. S. limbs micr. in rev.	1.036 = 20.19
Variation of A. R. in 7*m.* 18*s.*	+ 4.09	Variation of declination in 7*m.* 18*s.*	— 0.35
Observed P. F. diameter	18.02	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	17.64

	″		″
Δ ρ at 5 h. 11 m.	0.30	Δ ρ at 5 h. 19 m.	0.32

JANUARY 9, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars	N.P.	41.2	54.2	7.5	21.0	33.7	3 32 7.52	+ 0.54			28.096	71.3	53.8
2	Bessel	523	41.2	54.2	7.6	21.2	34.0	3 38 7.64	17.66	—6 0.12	—17.12			
3	Mars	S.F.	47.5	1.0	14.5	27.5	40.2	3 42 14.14	0.62			Ther. att. 72°.0 Bar. red. to 32° F. 27.978		
4	Bessel	523	46.5	59.7	13.0	26.0	39.0	3 48 12.84	18.74	5 58.70	18.12			
5	Mars	N.P.	10.0	23.0	36.2	49.5	2.2	3 52 36.18	1.84					
6	Bessel	523	10.2	23.5	36.5	50.0	2.8	3 58 36.60	19.02	6 0.42	17.18			
7	Mars	S.F.	. .	49.5	2.5	16.0	28.8	4 2 2.59	1.40					
8	Bessel	523	. .	49.2	2.2	15.7	28.2	4 8 2.21	19.55	5 59.62	18.15			
9	Mars	N.P.	11.5	25.0	38.2	51.3	4.0	4 11 38.00	2.97					
10	Bessel	523	12.5	26.0	39.0	52.5	5.2	4 17 39.04	20.17	6 1.04	17.20			
11	Mars	S.F.	33.0	46.3	59.5	12.8	25.5	4 21 59.42	0.83					
12	Bessel	523	33.5	47.0	0.0	13.5	26.2	4 28 0.04	19.09	6 0.62	18.16			
13	Mars	N.P.	15.5	28.8	42.0	55.3	8.0	4 42 41.92	1.18					
14	Bessel	523	17.5	31.0	44.0	57.5	10.2	4 48 44.04	18.51	6 2.12	17.32			
15	Mars	S.F.	30.2	43.5	56.5	10.0	22.6	4 50 56.56	0.40					
16	Bessel	523	31.5	44.7	58.0	11.5	24.0	4 56 57.94	18.68	6 1.38	18.28			
17*a*	Mars	N.P.	27.2	40.5	53.5	7.0	19.8	4 58 53.60	1.58					
18	Bessel	523	30.5	43.5	56.5	9.8	22.8	4 4 56.62	18.92	6 3.02	17.34			
19	Mars	S.F.	16.8	30.0	43.0	56.5	9.2	5 7 43.10	0.90					
20	Bessel	523	18.7	32.0	45.0	58.5	11.2	5 13 45.08	19.23	6 1.98	18.33			
21	Mars	N.P.	30.0	43.5	56.5	10.0	22.5	5 15 56.50	1.11					
22	Bessel	523	33.5	46.6	59.7	13.3	26.0	5 21 59.82	18.43	6 3.32	17.32			
23	Mars	S.F.	42.3	55.5	8.5	22.8	34.5	5 24 8.72	1.31					
24	Bessel	523	45.0	58.3	11.2	24.8	37.5	5 30 11.36	19.73	6 2.64	18.42			
25	Mars	N.P.	7.8	21.2	34.3	47.7	0.5	5 32 34.30	2.70					
26	Bessel	523	11.7	25.0	38.2	51.7	4.5	5 38 38.22	20.07	6 3.92	17.37			
27	Mars	S.F.	10.5	23.8	37.0	50.5	3.0	5 40 36.96	1.00					
28	Bessel	523	12.8	26.0	39.4	53.0	5.8	5 46 39.40	19.46	6 2.44	18.46			
29	Mars	N.P.	18.0	31.5	44.5	58.0	10.5	5 49 44.50	2.46					
30	Bessel	523	22.6	36.0	49.0	2.5	15.2	5 55 49.06	+19.87	—6 4.56	— 17.41			

JANUARY 9, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
31	Mars . . .	S.F.	53.2	6.5	19.6	33.0	45.8	5 58 19.62	+1.57			28.096	71.3	53.8
32	Bessel . . .	523	57.5	11.0	24.2	37.5	50.3	6 4 24.10	19.90	—6 4.48	—18.33			
33 b	Mars . . .	N.P.	15.5	28.8	42.0	55.5	8.2	6 6 42.00	0.81			Ther. att. 72°.0 Bar. red. to 32° F. 27.978		
34	Bessel . . .	523	21.5	35.0	48.0	1.5	14.2	6 12 48.04	18.25	6 6.04	17.44			
35	Mars . . .	S.F.	39.3	52.5	6.0	19.2	32.0	6 15 5.80	1.43					
36	Bessel . . .	523	43.7	56.5	10.7	24.0	36.8	6 21 10.34	19.82	6 4.54	18.39			
37	Mars . . .	N.P.	43.5	57.0	10.5	24.0	36.8	6 23 10.36	1.33					
38	Bessel . . .	523	51.0	4.4	17.3	30.6	43.2	6 29 17.30	18.86	6 6.94	17.53			
39	Mars . . .	S.F.	51.2	4.5	17.5	31.0	43.6	6 31 17.56	0.30					
40	Bessel . .	523	56.5	9.5	23.0	36.5	49.2	6 37 22.94	+18.80	—6 5.38	—18.50			

Remarks.

Night very fair for observations almost throughout. The opinion first formed respecting the magnitude of the comparing star is unchanged.

a Badly defined and unsteady. *b* Excellent.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Ten transits . . .	5 2 36.49	—6 3.150	—17.323	=5 37.62
Mean S. F. . . .	Ten transits . . .	5 11 26.45	—6 2.178	18.314	=5 56.93

	h. m.	s.
Correction for chronometer at	5 3	— 37.47
Correction for chronometer at	5 11	— 37.49

	h. m. s.
Santiago sid. time N. P.	5 1 59.02
Santiago sid. time S. F.	5 10 48.96
Interval	8 49.94

	″
Δ P. F. limbs in A. R. reduced to arc . . .	14.58
Variation of A. R. in 8*m*. 50*s*.	+ 4.60
Observed P. F. diameter	19.18

	″
Δ N. S. limbs mic. in rev.	0.991 = 19.31
Variation of declination in 8*m*. 50*s*. . .	— 0.40
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	16.71

h. m.	″
Δ ρ at 5 5	0.36
Δ ρ at 5 14	0.38

JANUARY 10, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	396	41.2	54.5	7.5	21.0	33.7	3 55 7.58	—12.49			28.140	70.5	53.9
2	Mars . . .	N.P.	35.2	48.8	1.8	15.3	28.0	4 3 1.82	0.48	+7 54.24	+12.01			
3	Bessel . . .	396	40.5	53.7	7.0	20.2	33.0	4 8 6.88	12.84			Ther. att. 71°.1 Bar. red. to 32° F. 28.024		
4	Mars . . .	S.F.	35.7	49.2	2.0	15.5	28.2	4 16 2.12	1.83	7 55.24	11.01			
5	Bessel . . .	396	22.0	35.2	48.3	1.6	14.5	4 17 48.32	12.97					
6	Mars . . .	N.P.	15.2	28.2	41.3	54.7	7.2	4 25 41.32	0.87	7 53.00	12.10			
7	Bessel . . .	396	53.0	6.2	19.3	32.8	45.2	4 27 19.30	12.69					
8	Mars . . .	S.F.	46.5	0.0	13.2	26.5	39 2	4 35 13.08	—1.69	+7 53.78	+11.00			

JANUARY 10, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
9 *a*	Bessel . . . 396	36.5	49.7	3.0	16.2	29.0	4 37 2.88	—12.42			28.140	70.5	53.9
10	Mars . . . N.P.	28.8	41.8	55.1	8.2	21.0	4 44 54.98	0.44	+7 52.10	+11.98			
11	Bessel . . . 396	45.0	57.8	11.2	24.5	37.2	4 47 11.14	12.16			Ther. att. 71°.1		
12	Mars . . . S.F.	37.8	51.2	4.4	17.6	30.3	4 55 4.26	1.19	7 53.12	10.97	Bar. red. to 32° F.		
13	Bessel . . . 396	2.0	15.2	28.5	41.5	54.3	4 58 28.30	11.92			28.024		
14 *b*	Mars . . . N.P.	53.5	6.5	19.5	33.0	45.5	5 6 19.60	±0.00	7 51.30	11.92			
15	Bessel . . . 396	17.0	29.2	42.5	56.0	8.7	5 9 42.68	—6.83					
16 *b*	Mars . . . S.F.	8.3	21.5	34.7	48.0	0.8	5 17 34.66	+4.12	7 51.98	10.95			
17	Bessel . . . 396	59.0	12.2	25.5	38.8	11.5	5 19 25.40	—6.63					
18 *c*	Mars . . . N.P.	50.5	4.0	17.2	30.5	43.2	5 27 17.08	+5.26	7 51.68	11.89			
19	Bessel . . . 396	45.0	58.2	11.2	24.8	37.5	5 29 11.34	—6.16					
20	Mars . . . S.F.	36.2	49.8	3.0	16.5	29.2	5 37 2.94	+4.81	7 51.60	10.97			
21	Bessel . . . 396	19.0	32.5	45.3	58.5	11.5	5 38 45.36	—5.96					
22 *d*	Mars . . . N.P.	9.5	22.5	35.5	48.9	1.5	5 46 35.58	+5.93	7 50.22	11.89			
23	Bessel . . . 396	13.4	26.6	39.7	53.0	5.8	5 48 39.70	—5.72					
24	Mars . . . S.F.	5.1	18.4	31.5	44.7	57.5	5 56 31.44	+5.19	7 51.74	10.91			
25	Bessel . . . 396	24.2	37.6	50.8	4.2	17.0	5 58 50.76	—5.45					
26	Mars . . . N.P.	14.5	27.5	40.5	53.8	6.5	6 6 40.56	+6.40	7 49.80	11.85			
27	Bessel . . . 396	13.0	26.2	39.5	52.8	5.5	6 8 39.40	—5.39					
28	Mars . . . S.F.	3.5	17.0	30.2	43.5	56.2	6 16 30.08	+5.54	7 50.68	10.93			
29	Bessel . . . 396	54.3	7.5	20.6	34.0	46.8	6 18 20.64	—5.28					
30 *e*	Mars . . . N.P.	. .	.	9.5	23.0	36.2	6 26 9.72	+6.70	7 49.08	11.98			
31	Bessel . . . 396	40.0	53.2	6.5	19.8	32.5	6 29 6.40	—5.22					
32	Mars . . . S.F.	30.2	43.5	56.5	9.5	22.5	6 36 56.44	+5.56	7 50.04	10.78			
33	Bessel . . . 396	9.2	22.5	35.7	49.0	1.8	6 39 35.64	—4.91					
34 *f*	Mars . . . N.P.	57.0	10.2	23.3	36.5	49.3	6 47 23.26	+6.89	7 47.62	11.80			
35	Bessel . . . 396	8.5	21.7	35.0	48.2	1.0	6 49 34.88	—4.95					
36 *f*	Mars . . . S.F.	58.0	11.2	24.5	37.8	50.5	6 57 24.40	+5.90	+7 49.62	+10.85			

Remarks.

A bright, clear night, which renders all objects wonderfully distinct; but a cold SE. wind succeeding a warm day, creates currents in the air, and renders their images somewhat unsteady. Altogether, the night is a very fair one. The star is fully of the assigned magnitude.

a Excellent.
b Very unsteady.
c Blazing.
d Tolerably steady.
e Indifferent.
f Good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	Nine transits	5 26 1.55	+ 7 51.004	+ 11.935	= 3 52.61
Mean S. F.	Nine transits	5 36 28.82	+ 7 51.978	+ 10.930	= 3 33 03

	h. m. s.
Correction for chronometer at 5 26	— 40.38
Correction for chronometer at 5 36	— 40.39
Santiago sid. time N. P.	5 25 21.17
Santiago sid. time S. F.	5 35 48.43
Interval	10 27.26

	″
Δ P. F. limbs in A. R. reduced to arc . . .	14.61
Variation of A. R in 10*m*. 27*s*.	+ 4.95
Observed P. F. diameter	19.56
Δ N. S. limbs micr. in rev.	1.005 = 19.59
Variation of declination in 10*m*. 27*s*. . .	— 0.47
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	16.92

	″
Δ ρ at 5 21 (h. m.)	0.24
Δ ρ at 5 32 (h. m.)	0.24

JANUARY 11, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 396	48.8	2.5	15.8	28.3	41.2	3 48 15.32	—3.21			28.150	73.4	58.8
2	Mars . . . N.P.	58.8	11.8	24.8	38.2	50.8	3 55 24.88	+5.56	+7 9.56	+8.77			
3	Bessel . . . 396	50.3	3.3	16.5	29.8	42.5	4 0 16.58	—4.14			Ther. att. 72°.8 Bar. red. to 32° F. 28.029		
4	Mars . . . S.F.	0.5	13.5	26.5	40.0	52.8	4 7 26.66	+3.58	7 10.08	7.72			
5	Bessel . . . 396	28.0	41.3	54.3	7.8	20.5	4 11 54.38	—3.66					
6	Mars . . . N.P.	37.0	50.0	3.2	16.5	29.2	4 19 3.18	+5.07	7 8.80	8.73			
7	Bessel . . . 396	37.3	50.7	3.8	17.2	29.9	4 21 3.98	—3.54					
8	Mars . . . S.F.	. .	0.6	13.5	27.0	39.5	4 28 13.54	+4.35	7 9.56	7.89			
9	Bessel . . . 396	56.5	10.0	23.0	36.5	49.2	4 30 22.84	—3.43					
10	Mars . . . N.P.	5.3	18.5	31.5	44.8	57.5	4 37 31.52	+5.22	7 8.68	8.65			
11	Bessel . . . 396	54.5	7.5	20.8	34.0	46.8	4 39 20.72	—3.19					
12	Mars . . . S.F.	3.5	16.5	29.5	43.0	55.7	4 46 29.64	+4.59	7 8.92	7.78			
13	Bessel . . . 396	28.5	41.5	54.7	8.0	20.8	4 48 54.70	—3.04					
14	Mars . . . N.P.	36.2	49.2	2.4	15.8	28.5	4 56 2.42	+5.69	7 7.72	8.73			
15	Bessel . . . 396	25.5	39.0	52.2	5.5	18.2	4 58 52.08	—2.73					
16	Mars . . . S.F.	33.5	47.0	0.2	13.5	26.2	5 6 0.08	+4.92	7 8.00	7.65			
17	Bessel . . . 396	18.5	32.0	45.0	58.0	11.2	5 7 45.14	—2.44					
18	Mars . . . N.P.	25.8	39.0	52.0	5.2	18.0	5 14 52.00	+6.16	7 6.86	8.60			
19	Bessel . . . 396	17.5	30.7	43.8	57.0	9.8	5 16 43.76	—4.07					
20	Mars . . . S.F.	24.5	38.0	51.2	4.2	17.0	5 23 51.18	+3.63	7 7.32	7.70			
21	Bessel . . . 396	7.5	20.5	33.6	47.0	59.8	5 26 33.68	—4.09					
22	Mars . . . N.P.	14.2	27.5	40.5	54.0	6.8	5 33 40.60	+4.58	7 6.92	8.67			
23	Bessel . . . 396	58.0	11.2	24.5	37.8	50.5	5 35 24.40	—3.60					
24 a	Mars . . . S.F.	5.5	18.8	32.3	45.5	58.2	5 42 32.06	+4.03	7 7.66	7.63			
25	Bessel . . . 396	26.8	40.2	53.5	7.0	19.8	5 45 53.46	—3.42					
26	Mars . . . N.P.	32.7	46.0	59.0	12.5	25.0	5 52 59.04	+5.15	7 5.58	8.57			
27	Bessel . . . 396	10.5	23.8	37.0	50.4	3.2	5 54 36.98	—3.32					
28	Mars . . . S.F.	17.2	30.5	43.5	57.0	9.5	6 1 43.54	+4.26	7 6.56	7.58			
29	Bessel . . . 396	41.8	54.8	8.0	21.5	34.2	6 3 8.06	—3.23					
30	Mars . . . N.P.	47.0	0.3	13.3	26.7	39.5	6 10 13.36	+5.33	7 5.30	8.56			
31	Bessel . . 396	14.0	27.0	40.3	53.8	6.5	6 11 40.32	—2.74					
32	Mars . . . S.F.	20.5	33.8	47.0	0.5	13.2	6 18 47.00	+4.89	7 6.68	7.63			
33	Bessel . . . 396	52.0	5.2	18.5	31.5	44.5	6 20 18.34	—3.06					
34 b	Mars . . . N.P.	56.3	9.5	22.5	36.0	48.8	6 27 22.62	+5.40	7 3.28	8.46			
35	Bessel . . . 396	40.7	54.0	7.2	20.5	33.4	6 29 7.16	—3.05					
36 c	Mars . . . S.F.	47.0	0.0	13.2	26.3	39.5	6 36 13.20	+4.45	+7 6.04	+7.50			

Remarks.

Light, hazy cirri over most of the northern and northeastern portion of the sky during nearly all the period of observation. The effect was to cut off the flaring light so often mentioned in these measures, and to permit greater certainty in the contacts.

a Blazing.
b Ill defined and unsteady.
c Unsteady.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N.P. . .	Nine transits	5 14 7.74	+ 7 6.967 . . .	+ 8.638	= 2 48.35
Mean S.F. . .	Nine transits	5 23 28.55	+ 7 7.869 . . .	+ 7.675	= 2 29.58

JANUARY 11, 1850—Continued.

Results—Continued.

	h. m.	s.		h. m. s.
Correction for chronometer at	5 14	—44.33	Santiago sid. time N. P.	5 13 23.41
Correction for chronometer at	5 23	—44.33	Santiago sid. time S. F.	5 22 44.22
			Interval	9 20.81

	″		″
Δ P. F. limbs in A. R. reduced to arc	13.53	Δ N. S. limbs micr. in rev.	0.963 = 18.77
Variation of A. R. in 9*m*. 21*s*.	+ 4.15	Variation of declination in 9*m*. 21*s*.	— 0.42
Observed P. F. diameter	17.68	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	16.15

	h. m.	″		h. m.	″
Δ ρ at	5 10	0.18	Δ ρ at	5 18	0.16

JANUARY 12, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel	396	23.7	37.0	50.3	3.5	16.2	3 38 50.14	+1.65			28.066	74.5	59.2
2	Mars	N.P.	53.0	6.4	19.5	32.5	45.3	3 45 19.34	6.98	+6 29.20	+5.33			
3	Bessel	396	22.5	35.5	48.6	2.2	15.0	3 48 48.76	1.60			Ther. att. 73°.5		
4	Mars	S.F.	52.5	5.5	18.5	32.0	44.7	3 55 18.64	6.11	6 29.88	4.51	Bar. red. to 32° F. 27.943		
5	Bessel	396	37.0	49.8	3.0	16.5	29.2	3 58 3.10	2.19					
6	Mars	N.P.	5.2	18.5	31.5	45.0	57.3	4 4 31.50	7.57	6 28.40	5.38			
7	Bessel	396	13.6	27.5	41.0	54.5	7.2	4 8 40.76	0.38					
8	Mars	S.F.	43.6	57.0	10.2	23.5	36.2	4 15 10.10	4.83	6 29.34	4.45			
9	Bessel	396	55.0	8.5	21.6	35.0	47.7	4 18 21.56	1.28					
10	Mars	N.P.	. .	36.0	49.3	2.5	15.8	4 24 49.29	6.72	6 27.73	5.44			
11	Bessel	396	18.1	31.1	44.5	58.0	10.5	4 26 44.44	0.37					
12	Mars	S.F.	47.0	0.2	13.3	26.8	39.5	4 33 13.36	4.83	6 28.82	4.46			
13	Bessel	396	22.3	35.5	48.8	2.0	15.0	4 34 48.74	0.26					
14	Mars	N P.	49.5	2.7	16.0	29.3	42.0	4 41 15.90	5.76	6 27.16	5.40			
15	Bessel	396	25.5	38.8	52.0	5.3	18.0	4 42 51.92	0.44					
16	Mars	S.F.	53.8	7.0	20.3	33.5	46.2	4 49 20.16	4.82	6 28.24	4.38			
17	Bessel	396	36.2	49.5	2.5	16.0	28.8	4 51 2.60	0.68					
18	Mars	N.P.	3.0	16.2	29.8	42.8	55.5	4 57 29.46	6.03	6 26.86	5.35			
19	Bessel	396	40.8	54.3	7.6	21.2	33.8	5 0 7.54	0.95					
20	Mars	S.F.	8.5	21.5	35.3	48.8	1.5	5 6 35.12	5.31	6 27.58	4.36			
21	Bessel	396	48.8	2.0	15.2	28.5	41.2	5 8 15.14	1.12					
22	Mars	N.P.	15.3	28.5	41.5	55.0	7.5	5 14 41.56	6.40	6 26.42	5.28			
23	Bessel	396	52.8	6.0	19.2	32.5	45.3	5 16 19.16	1.26					
24	Mars	S.F.	19.2	32.3	45.7	59.2	11.8	5 22 45.64	5.59	6 26.48	4.33			
25	Bessel	396	0.5	13.5	27.0	40.5	53.2	5 24 26.94	1.39					
26	Mars	N.P.	26.5	39.5	52.9	6.1	18.9	5 30 52.78	6.64	6 25.84	5.25			
27	Bessel	396	5.7	19.0	32.2	45.5	58.2	5 32 32.12	1.50					
28	Mars	S.F.	32.2	45.8	59.2	12.5	25.2	5 38 58.98	5.81	6 26.86	4.31			
29	Bessel	396	0.5	13.5	27.0	40.2	53.0	5 39 26.84	1.57					
30	Mars	N.P.	26.0	39.2	52.3	5.5	18.2	5 46 52.24	6.92	6 25.40	5.35			
31	Bessel	396	26.3	39.5	52.5	6.0	18.5	5 56 52.56	1.73					
32	Mars	S.F.	52.0	5.5	18.8	32.2	45.0	6 3 18.70	6.00	6 26.14	4.27			
33	Bessel	396	21.3	34.0	47.5	1.2	14.0	6 4 47.60	1.74					
34	Mars	N.P.	46.2	59.5	12.5	25.8	38.5	6 11 12.50	+6.93	+6 24.90	+5.19			

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
	JANUARY 12, 1850—Continued.												
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
35	Bessel . . . 396	39.2	52.3	5.5	19.0	31.7	6 13 5.54	+1.81			28.066	74.5	59.2
36	Mars . . . S.F.	5.0	18.3	31.5	44.8	57.5	6 19 31.42	6.13	+6 25.88	+4.32			
37	Bessel . . . 396	39.0	52.5	5.2	19.0	31.8	6 21 5.50	1.77			Ther. att. 73°.5		
38	Mars . . . N.P.	3.5	16.5	29.5	43.2	56.0	6 27 29.74	6.95	6 24.24	5.18	Bar. red. to 32° F. 27.943		
39	Bessel . . . 396	41.6	55.0	8.0	21.5	34.2	6 29 8.06	1.74					
40	Mars . . . S.F.	7.0	20.2	33.3	46.8	59.5	6 35 33.36	+5.95	+6 25.30	+4.21			

Remarks.

Somewhat hazy, but favorable to clear, sharp outlines of figures and apparent steadiness of motion. The measures are generally very good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	Ten transits . . .	5 6 27.43	+ 6 26.615	+ 5.315	= 1 43.58
Mean S. F.	Ten transits . . .	5 15 58.55	+ 6 27.452	+ 4.360	= 1 24.98

	h. m.	s.		h. m. s.
Correction for chronometer at	5 6	—46.60	Santiago sid. time N. P.	5 5 40.83
Correction for chronometer at	5 16	—46.62	Santiago sid. time S. F.	5 15 11.93
			Interval	9 31.10

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	12.55	Δ N. S. limbs mic. in rev.	0.955 = 18.61
Variation of A. R. in 9*m*. 31*s*.	+ 3.85	Variation of declination in 9*m*. 31*s*. . .	— 0.43
Observed P. F. diameter	16.40	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	15.98

h. m.	″	h. m.	″
Δ ρ at 5 2	0.11	Δ ρ at 5 12	0.09

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
	JANUARY 13, 1850.												
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 396	54.3	7.5	20.5	34.0	47.0	3 44 20.66	+1.59			27.976	77.3	61.5
2	Mars . . . N.P.	45.8	59.0	12.3	25.2	38.0	3 50 12.06	3.83	+5 51.40	+2.24			
3	Bessel . . . 396	49.0	2.0	15.5	29.0	42.0	3 53 15.50	1.85			Ther. att. 73°.7		
4	Mars . . . S.F.	41.5	55.0	8.0	21.5	34.3	3 59 8.06	2.95	5 52.56	1.10	Bar. red. to 32° F. 27.849		
5	Bessel . . 396	3.5	16.5	29.5	43.5	56.5	4 1 29.90	2.13					
6	Mars . . . N.P.	. .	8.0	21.2	34.5	47.2	4 7 21.12	4.35	5 51.22	2.22			
7	Bessel . . . 396	. .	0.5	13.5	27.0	39.8	4 15 13.59	2.92					
8	Mars . . . S.F.	39.0	52.2	5.3	18.6	3.3	4 21 5.68	4.02	5 52.09	1.10			
9	Bessel . . . 396	17.0	30.3	43.5	57.0	9.8	4 22 43.52	2.95					
10	Mars . . . N.P.	7.5	21.0	34.2	47.5	0.2	4 28 34.08	5.08	5 50.56	2.13			
11	Bessel . . . 396	0.5	14.0	27.0	40.5	53.2	4 30 27.04	3.11					
12 *a*	Mars . . . S.F.	52.2	5.3	18.5	31.8	44.5	4 36 18.46	4.19	5 51.42	1.08			
13	Bessel . . . 396	57.0	10.3	23.3	36.8	49.5	4 38 23.38	0.50					
14	Mars . . . N.P.	47.0	0.2	13.4	26.6	39.5	4 44 13.32	+2.62	+5 49.94	+2.12			

JANUARY 13, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
15	Bessel . . . 396	26.3	39.5	52.7	6.0	18.7	4 45 52.64	+0.43			27.976	77.3	61.5
16	Mars . . . S.F.	17.0	30.3	43.5	56.9	9.6	4 51 43.46	1.52	+5 50.82	+1.09			
17	Bessel . . . 396	56.3	9.2	22.5	35.7	48.3	4 53 22.40	0.46			Ther. att. 73°.7 Bar. red. to 32° F. 27.849		
18 *b*	Mars . . . N.P.	45.0	58.1	11.2	24.5	37.3	4 59 11.22	2.62	5 48.82	2.16			
19	Bessel . . . 396	52.0	5.0	18.3	31.5	44.2	5 1 18.20	0.87					
20	Mars . . . N.P.	42.5	55.5	8.5	22.0	34.8	5 7 8.66	1.87	5 50.46	1.00			
21	Bessel . . . 396	25.3	38.8	51.8	5.0	17.8	5 8 51.74	0.93					
22	Mars . . . N.P.	14.2	27.5	40.5	53.8	6.5	5 14 40.50	2.95	5 48.76	2.02			
23	Bessel . . . 396	58.2	12.0	25.0	38.4	51.2	5 17 24.96	1.05					
24	Mars . . . S.F.	48.6	2.0	15.2	28.5	41.2	5 23 15.10	2.11	5 50.14	1.06			
25	Bessel . . . 396	16.8	30.2	43.3	56.8	9.5	5 24 43.32	1.28					
26 *c*	Mars . . . N.P.	6.0	19.3	32.5	45.5	58.5	5 30 32.36	3.32	5 49.04	2.04			
27	Bessel . . . 396	44.5	57.7	11.0	24.5	37.0	5 32 10.94	1.31					
28	Mars . . . S.F.	34.0	47.5	1.0	14.2	26.8	5 38 0.75	2.36	5 49.81	1.05			
29	Bessel . . . 396	9.5	22.8	36.0	49.5	2.3	5 39 36.02	1.60					
30	Mars . . . N.P.	58.5	11.6	24.7	38.0	50.7	5 45 24.70	3.58	5 48.68	1.98			
31	Bessel . . . 396	27.0	40.5	53.5	6.9	19.7	5 46 53.52	1.52					
32	Mars . . . S.F.	16.5	29.7	42.7	56.0	8.8	5 52 42.74	2.48	5 49.22	0.96			
33	Bessel . . . 396	0.5	13.7	27.0	40.3	53.0	5 54 26.90	1.55					
34	Mars . . . N.P.	48.5	1.5	15.0	28.0	41.0	6 0 14.80	3.53	5 47.90	1.98			
35	Bessel . . . 396	30.3	43.5	56.6	10.0	22.8	6 1 56.64	1.73					
36	Mars . . . S.F.	19.2	31.4	44.7	58.2	11.0	6 7 44.90	+2.71	+5 48.26	+0.98			

Remarks.

During the first hour, light cirri interposed, rendering the comparing star indistinct. The night was without much atmospheric fluctuation, and measures very generally good.

a Clear.

b Steady; very good.

c Recorded 27.5*s.* at wire C.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	Nine transits . . .	4 57 49.35	+ 5 49.591	+ 2.099	= 0 40.91
Mean S. F.	Nine transits . . .	5 6 20.86	+ 5 50.531	+ 1.047	= 0 20.41

	h. m.	s.
Correction for chronometer at	4 58	— 49.10
Correction for chronometer at	5 6	— 49.11

	h. m. s.
Santiago sid. time N. P.	4 57 0.25
Santiago sid. time S. F.	5 5 31.75
Interval	8 31.50

	″
Δ P. F. limbs in A. R. reduced to arc . . .	14.10
Variation of A. R. in 8*m.* 31*s.*	+ 3.14
Observed P. F. diameter	17.24

	″
Δ N. S. limbs micr. in rev. . . . . . . 1.052 =	20.50
Variation of declination in 8*m.* 31*s.* . . .	— 0.37
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	17.93

h. m.	″
Δ ρ at 4 54	0 04
Δ ρ at 5 3	0.02

JANUARY 14, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 396	7.2	20.5	34.0	47.3	59.8	3 38 33.76	—0.04			28.110	71.0	61.4
2	Mars . . . N.P.	25.3	38.5	51.6	4.9	17.6	3 43 51.58	—1.22	+5 17.82	—1.18			
3	Bessel . . . 396	38.5	52.0	5.1	18.5	31.2	3 47 5.06	+4.33			Ther. att. 72°.0 Bar. red. to 32° F. 27.992		
4	Mars . . . S.F.	56.8	10.5	23.5	37.0	49.8	3 52 23.52	2.21	5 18.46	2.12			
5	Bessel . . . 396	5.2	18.5	31.5	44.8	57.5	4 9 31.50	4.41					
6	Mars . . . N.P.	22.1	35.3	48.5	1.8	14.5	4 14 48.44	3.31	5 16.94	1.10			
7	Bessel . . . 396	26.3	39.5	52.5	6.0	18.5	4 16 52.56	3.55					
8	Mars . . . S.F.	44.2	57.7	10.7	24.0	36.8	4 22 10.68	1.44	5 18.12	2.11			
9	Bessel . . . 396	25.1	38.3	51.3	4.5	17.5	4 23 51.34	3.35					
10	Mars . . . N.P.	41.8	54.8	8.0	21.4	34.2	4 29 8.04	2.22	5 16.70	1.13			
11	Bessel . . . 396	20.0	33.2	46.3	59.6	12.2	4 30 46.26	3.45					
12	Mars . . . S.F.	37.8	51.0	4.0	17.3	30.0	4 36 4.02	1.42	5 17.76	2.03			
13	Bessel . . . 396	21.4	34.5	47.6	1.0	13.7	4 37 47.64	3.64					
14	Mars . . . N.P.	37.5	51.0	4.2	17.5	30.2	4 43 4.08	2.50	5 16.44	1.14			
15	Bessel . . . 396	14.0	27.2	40.3	53.5	6.5	4 44 40.30	3.65					
16	Mars . . . S.F.	. .	. .	58.5	11.0	23.5	4 49 58.49	1.59	5 18.19	2.06			
17	Bessel . . . 396	29.5	42.8	56.0	9.2	22.0	4 51 55.90	4.02					
18	Mars . . . N.P.	45.5	58.5	11.8	25.2	38.0	4 57 11.80	2.85	5 15.90	1.17			
19	Bessel . . . 396	44.5	57.8	11.0	24.2	36.8	4 59 10.86	4.29					
20	Mars . . . S.F.	1.2	14.5	27.5	41.0	53.8	5 4 27.60	2.14	5 16.74	2.05			
21	Bessel . . . 396	47.1	0.3	13.5	26.8	39.5	5 6 13.44	4.38					
22	Mars . . . N.P.	2.4	15.7	29.0	42.4	55.0	5 11 28.90	3.15	5 15.46	1.23			
23	Bessel . . . 396	52.1	5.3	18.5	32.0	44.5	5 13 18.48	4.49					
24	Mars . . . S.F.	8.5	22.0	35.0	48.5	1.2	5 18 35.04	2.28	5 16.56	2.21			
25	Bessel . . . 396	58.3	11.8	25.0	38.5	51.2	5 20 24.96	4.76					
26	Mars . . . N.P.	. .	. .	40.5	53.5	6.2	5 25 40.22	3.56	5 15.26	1.20			
27	Bessel . . . 396	6.5	19.6	32.8	46.2	38.8	5 27 32.78	4.85					
28	Mars . . . S.F.	22.5	35.8	49.0	2.4	15.1	5 32 48.96	2.68	5 16.18	2.17			
29	Bessel . . . 396	11.3	24.6	37.7	51.0	3.8	5 34 37.68	4.90					
30 *a*	Mars . . . N.P.	26.3	39.6	52.5	5.9	18.7	5 39 52.60	3.58	5 14.92	1.32			
31	Bessel . . . 396	14.8	28.2	41.2	54.5	7.2	5 41 41.18	4.99					
32	Mars . . . S.F.	30.8	44.0	57.2	10.5	23.2	5 46 57.14	2.67	5 15.96	2.32			
33	Bessel . . . 396	22.0	35.3	48.5	1.5	14.5	5 48 48.36	5.19					
34	Mars . . . N.P.	36.3	50.3	3.2	16.5	29.2	5 54 3.10	3.86	5 14.74	1.33			
35	Bessel . . . 396	17.6	31.0	44.0	57.3	10.3	5 55 44.04	5.59					
36	Mars . . . S.F.	33.5	46.8	0.0	13.5	26.2	6 1 0.00	3.35	5 15.96	2.24			
37	Bessel . . . 396	27.0	40.2	53.4	6.8	19.5	6 2 53.38	3.17					
38	Mars . . . N.P.	41.4	54.8	7.8	21.3	34.0	6 8 7.86	1.94	5 14.48	1.23			
39	Bessel . . . 396	38.7	52.0	5.2	18.5	31.0	6 11 5.08	3.70					
40	Mars . . . S.F.	53.5	7.0	20.2	33.5	46.2	6 16 20.08	1.43	5 15.00	2.27			
41	Bessel . . . 396	56.0	9.3	22.5	36.0	48.3	6 18 22.42	4.01					
42	Mars . . . N.P.	9.8	23.3	36.3	49.8	2.5	6 23 36.34	2.70	5 13.92	1.31			
43	Bessel . . . 396	59.0	12.2	25.3	38.6	51.5	6 25 25.32	3.99					
44	Mars . . . S.F.	13.7	27.0	40.2	53.5	6.2	6 30 40.12	1.76	5 14.80	2.23			
45	Bessel . . . 396	22.5	35.5	48.7	2.2	15.0	6 32 48.78	3.45					
46	Mars . . . N.P.	. .	49.5	2.5	15.8	28.5	6 38 2.22	+2.10	+5 13.44	—1.25			

JANUARY 14, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . .	396	54.5	7.8	21.0	34.0	47.0	6 40 20.86	+3.83			28.110	71.0	61.4
48	Mars . . .	S.F.	. .	22.0	35.2	48.8	1.5	6 45 35.27	+1.66	+5 14.41	—2.17			

Remarks.

Bright and cloudless, with rapidly cooling atmosphere, the planet flaring and unsteady during nearly all the observations.

a Good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Twelve transits . .	5 17 24.59	+ 5 15.502 . . .	— 1.216	= 0 23.70
Mean S. F. . . .	Twelve transits . .	5 24 45.08	+ 5 16.512 . . .	— 2.165	= 0 42.20

	s.		h. m. s.
Correction for chronometer at 5h 17m	— 51.43	Santiago sid. time N. P.	5 16 33.16
Correction for chronometer at 5h 25m	— 51.44	Santiago sid. time S. F.	5 23 53.64
		Interval	7 20.48

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	15.15	Δ N. S. limbs micr. in rev. . . . . . . 0.949 =	18.50
Variation of A. R. in 7*m*. 20*s*.	+ 2.42	Variation of declination in 7*m*. 20*s*. . .	— 0.31
Observed P. F. diameter	17.57	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	15.99
Δ ρ at 5h 14m	0.03	Δ ρ at 5h 21m	0.04

JANUARY 15, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	396	44.2	57.4	10.3	24.0	36.6	4 3 10.50	+6.61			28.091	76.0	62.7
2	Mars . . .	N.P.	31.5	44.7	57.7	11.2	24.0	4 7 57.82	2.37	+4 47.32	—4.24			
3	Bessel . . .	396	19.4	32.5	45.5	59.0	11.8	4 11 45.64	6.51			Ther. att. 75°.2		
4	Mars . . .	S.F.	7.4	20.8	33.8	47.6	0.0	4 16 33.92	1.19	4 48.28	5.32	Bar. red. to 32° F. 27.963		
5	Bessel . . .	396	4.5	17.8	30.8	44.2	57.0	4 18 30.86	6.87					
6	Mars . . .	N.P.	51.0	4.5	17.5	30.8	43.5	4 23 17.46	2.58	4 46.60	4.29			
7	Bessel . . .	396	35.5	48.5	1.7	15.0	28.0	4 25 1.74	7.11					
8	Mars . . .	S.F.	22.7	36.3	49.3	2.7	15.5	4 29 49.30	1.87	4 47.56	5.24			
9	Bessel . . .	396	4.8	18.0	31.1	44.5	57.3	4 31 31.14	7.33					
10	Mars . . .	N.P.	51.5	4.7	17.8	31.3	44.1	4 36 17.88	2.92	4 46.74	4.41			
11	Bessel . . .	396	35.5	48.7	1.8	15.3	28.0	4 38 1.86	5.66					
12	Mars . . .	S.F.	23.0	36.2	49.4	2.6	15.5	4 42 49.34	0.41	4 47.48	5.25			
13	Bessel . . .	396	2.0	15.1	28.3	41.5	54.3	4 44 28.24	5.41					
14	Mars . . .	N.P.	48.3	1.5	14.7	28.0	40.7	4 49 14.64	1.11	4 46.40	4.30			
15	Bessel . . .	396	37.7	50.8	4.0	17.4	30.2	4 51 4.02	5 66					
16	Mars . . .	S.F.	24.7	38.0	51.2	4.5	17.3	4 55 51.14	0.37	4 47.12	5.29			
17	Bessel . . .	396	3.5	16.9	30.2	43.5	56.1	4 57 30.04	5.83					
18	Mars . . .	N.P.	49.5	2.6	15.7	29.0	42.0	5 2 15.76	+1.44	+4 45.72	—4.39			

JANUARY 15, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
19	Bessel . . . 396	33.0	46.2	59.2	12.7	25.4	5 3 59.30	+5.98			28.091	76.0	62.7
20	Mars . . . S.F.	20.0	33.2	46.3	59.5	12.5	5 8 46.30	0.65	+4 47.00	—5.33			
21	Bessel . . . 396	3.5	16.8	29.8	43 2	56.0	5 10 29.86	6.23			Ther. att. 75°.2		
22 *a*	Mars . . . N.P.	47.5	1.5	14.5	28.0	40.5	5 15 14.40	1.76	4 44.54	4.47	Bar. red. to 32° F. 27.963		
23	Bessel . . . 396	38.0	51.2	4.3	17.8	30.5	5 17 4.36	6.35					
24	Mars . . . S.F.	24.7	38.2	51.3	4.5	17.5	5 21 51.24	0.92	4 46.88	5.43			
25	Bessel . . . 396	54.0	7.2	20.4	33.8	46.3	5 23 20.34	6.45					
26	Mars . . . N.P.	39.5	53.0	6.3	19.4	32.2	5 28 6.08	2.03	4 45.74	4.42			
27	Bessel . . . 396	14.6	27.7	41.0	54.3	7.0	5 29 40.92	6.55					
28	Mars . . S.F.	. .	14.5	27.5	40.8	53.5	5 34 27.47	1.18	4 46.55	5.37			
29	Bessel . . . 396	50.5	3.6	16.8	30.5	43.1	5 36 16.90	6.63					
30 *b*	Mars . . . N.P.	36.0	49.2	2.5	15.8	28.5	5 41 2.40	2.20	4 45.50	4.43			
31	Bessel . . . 396	45.7	59.0	12.3	25.7	38.5	5 43 12.24	7.02					
32	Mars . . . S.F.	32.5	45.5	58.8	12.2	25.0	5 47 58.80	1.60	4 46.56	5.42			
33	Bessel . . . 396	11.5	24.5	37.7	51.1	3.7	5 49 37.70	6.95					
34 *c*	Mars . . . N.P.	. .	8.5	21.6	35.0	47.8	5 54 21.62	2.42	4 43.92	4.53			
35	Bessel . . . 396	35.5	48.8	2.0	15.3	28.0	5 56 1.92	6.95					
36	Mars . . . S.F.	21.3	34.5	47.5	1.0	13.7	6 0 47.60	1.42	4 45.68	5.53			
37 *d*	Bessel . . . 396	54.4	7.5	20.8	34.2	46.8	6 2 20.74	7.02					
38 *e*	Mars . . . N.P.	39.2	52.4	5.5	18.8	31.5	6 7 5.48	2.48	4 44.74	4.54			
39	Bessel . . . 396	8.4	21.5	34.8	48.0	0.5	6 8 34.64	7.12					
40	Mars . . . S.F.	54.0	7.0	20.2	33.6	46.4	6 13 20.24	1.63	4 45.60	5.49			
41	Bessel . . . 396	23.5	36.8	50.0	3.2	16.0	6 14 49.90	7.32					
42	Mars . . . N.P.	8.0	21.3	34.5	47.8	0.5	6 19 34.42	2.87	4 44.52	4.45			
43	Bessel . . . 396	46.5	59.6	13.0	26.5	39.0	6 21 12.92	6.15					
44	Mars . . . S.F.	32.0	45.2	58.5	11.8	24.5	6 25 58.40	0.70	4 45.48	5.45			
45	Bessel . . . 396	59.3	12.5	25.5	39.0	51.5	6 27 25.56	6.42					
46	Mars . . . S.P.	. .	56.5	9.5	23.0	36.0	6 32 9.65	1.04	4 44.09	5.38			
47	Bessel . . . 396	56.0	9.5	22.8	36.5	49.0	6 35 22.76	6.53					
48	Mars . . . N.F.	41.5	55.0	8.2	21.6	34.3	6 40 8.12	+1.95	+4 45.36	—4.58			

Remarks.

A remarkably clear night, without the least visible haze or cloud, and the stars shining with unusual lustre. The observations are very fair throughout.

a Unsteady.
b Steady.
c Very good.
d Micrometer recorded + 8 02 rev.
e Good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Eleven transits . . .	5 14 57.09	+4 45.613	—4.406	=1 25.87
Mean S. F. . .	Eleven transits . . .	5 21 39.43	4 46.745	5.375	1 44.76
Mean S. P. . .	One transit	6 32 9.65	4 44.090	5.380	1 44.85
Mean N. F. . .	One transit	6 40 8.12	+4 45.360	—4.580	=1 29.26

	h. m.	h. m. s.
Correction for chronometer at	5 15 . . —	54.05
Correction for chronometer at	5 22 . . —	54.06
Santiago sid. time N. P		5 14 3.04
Santiago sid. time S. F		5 20 45.37
Interval		6 42.33

	h. m.	h. m. s.
Correction for chronometer at	6 32 . . —	54.19
Correction for chronometer at	6 40 . .	54.20
Santiago sid. time S. P.		6 31 15.46
Santiago sid. time N. F.		6 39 13.92
Interval		7 58.46

JANUARY 15, 1850—Continued.

Results—Continued.

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	16.98	Δ N. S. limbs micr. in rev.	0.969 = 18.89
Variation of A. R. in 6*m*. 42*s*.	+ 1.95	Variation of declination in 6*m*. 42*s*. . .	— 0.29
Observed P. F. diameter	18.93	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	16.40

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	19.05	Δ N. S. limbs micr. in rev.	0.800 = 15.59
Variation of A. R. in 7*m*. 58*s*.	— 2.34	Variation of declination in 7*m*. 58*s*. . .	+ 0.35
Observed P. F. diameter	16.71	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.74

h. m.	″	h. m.	″
Δ ρ at 5 12	0.09	Δ ρ at 6 29	0.12
Δ ρ at 5 18	0.11	Δ ρ at 6 37	0.11

JANUARY 16, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	396	41.3	54.5	7.6	21.2	33.8	3 50 7.68	+8.73			28.039	74.5	61.0
2	Mars . . .	N.P.	2.5	15.8	28.8	42.0	54.8	3 54 28.78	1.43	+4 21.10	—7.30			
3	Bessel . . .	396	23.0	36.0	49.0	2.5	15.2	3 56 49.14	8.93			Ther. att. 73°.7 Bar. red. to 32° F. 27.912		
4	Mars . . .	S.F.	44.6	58.0	11.1	34.5	37.3	4 1 11.10	0.64	4 21.96	8.29			
5	Bessel . . .	396	11.8	25.0	38.0	51.5	4.5	4 4 38.16	9.55					
6	Mars . . .	N.P.	32.5	45.7	58.7	12.1	24.7	4 8 58.74	2.18	4 20.58	7.37			
7	Bessel . . .	396	18.0	31.3	45.0	58.5	11.0	4 10 44.76	9.58					
8	Mars . . .	S.F.	40.6	53.6	6.8	20.3	33.2	4 15 6.90	1.25	4 22.14	8.33			
9	Bessel . . .	396	13.1	26.2	39.5	52.8	5.2	4 16 39.36	9.95					
10	Mars . . .	N.P.	33.7	47.5	0.5	13.5	26.3	4 21 0.30	2.59	4 20.94	7.36			
11	Bessel . . .	396	22.3	35.3	48.5	1.3	14.5	4 22 48.38	9.06					
12	Mars . . .	S.F.	43.7	57.0	10.0	23.5	36.3	4 27 10.10	0.74	4 21.72	8.32			
13	Bessel . . .	396	21.5	34.7	48.0	1.3	14.0	4 28 47.90	8.88					
14	Mars . . .	N.P.	. .	55.3	8.3	21.5	34.3	4 33 8.22	1.49	4 20.32	7.39			
15	Bessel . . .	396	46.5	59.8	13.0	26.5	39.0	4 40 12.96	9.17					
16	Mars . . .	S.F.	7.7	31.2	34.0	47.5	0.5	4 44 34.18	0.74	4 21.22	8.43			
17	Bessel . . .	396	33.2	46.5	59.5	13.0	35.3	4 45 59.60	9.42					
18	Mars . . .	N.P.	53.2	6.5	19.7	33.0	45.7	4 50 19.62	1.94	4 20.02	7.48			
19	Bessel . . .	396	28.8	42.2	55.2	8.5	21.2	4 51 55.18	9.50					
20	Mars . . .	S.F.	50.3	3.5	16.5	30.0	42.5	4 56 16.56	1.12	4 21.38	8.38			
21	Bessel . . .	396	26.2	39.3	52.5	6.0	18.6	5 0 52.52	9.73					
22	Mars . . .	N.P.	45.5	59.0	12.3	25.8	38.5	5 5 12.22	2.28	4 19.70	7.45			
23	Bessel . . .	396	28.2	41.5	54.5	8.0	20.5	5 6 54.54	9.86					
24 *a*	Mars . . .	S.F.	49.0	2.2	15.3	28.6	41.3	5 11 15.28	1.40	4 20.74	8.46			
25	Bessel . . .	396	48.0	1.3	14.5	27.8	40.5	5 13 14.42	10.01					
26	Mars . . .	N.P.	7.5	20.5	34.0	47.5	0.2	5 17 33.94	2.51	4 19.52	7.50			
27	Bessel . . .	396	0.0	13.4	26.5	39.8	52.5	5 19 26.44	10.22					
28	Mars . . .	S.F.	21.0	34.2	47.5	0.5	13.5	5 23 47.34	1.78	4 20.90	8.44			
29	Bessel . . .	396	10.0	23.7	37.0	50.3	3.0	5 25 37.30	10.30					
30 *b*	Mars . . .	N.P.	32.5	45.8	58.7	12.2	25.0	5 29 58.84	2.74	4 21.54	7.56			
31	Bessel . . .	396	25.0	38.2	51.2	4.5	17.5	5 31 51.28	9.47					
32	Mars . . .	S.F.	44.5	58.5	11.5	25.0	37.7	5 36 11.44	+0.99	+4 20.16	—8.48			

JANUARY 16, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
33	Bessel . . .	396	48.0	1.4	14.6	28.0	40.5	5 38 14.50	+9.55			28.039	74.5	61.0
34 c	Mars . . .	N.P.	7.5	20.5	33.5	46.8	59.7	5 42 33.60	2.04	+4 19.10	−7.51			
35	Bessel . . .	396	42.2	55.2	8.4	21.8	34.5	5 44 8.42	9.65			Ther. att. 73°.7		
36	Mars . . .	S.F.	1.7	15.5	28.5	41.8	54.8	5 48 28.46	1.18	4 20.04	8.47	Bar. red. to 32° F. 27.912		
37	Bessel . . .	396	46.0	59.4	12.2	25.8	38.3	5 50 12.34	9.90					
38 d	Mars . . .	N.P.	. .	18.3	31.2	44.5	57.2	5 54 31.20	2.30	4 18.86	7.60			
39	Bessel . . .	396	8.0	21.0	34.3	47.5	0.2	5 56 34.20	9.99					
40	Mars . . .	S.F.	27.5	41.0	54.3	7.5	20.3	6 0 54.12	1.42	4 19.92	8.57			
41	Bessel . . .	396	5.2	18.6	31.5	45.0	57.7	6 2 31.60	10.52					
42	Mars . . .	N.P.	24.3	37.5	50.5	3.5	16.5	6 6 50.46	2.92	4 18.86	7.60			
43	Bessel . . .	396	9.3	22.5	35.5	49.0	1.5	6 8 35.56	8.76					
44	Mars . . .	S.F.	29.0	42.2	55.5	8.7	21.5	6 12 55.38	0.19	4 19.82	8.57			
45	Bessel . . .	396	14.2	27.5	40.6	54.0	5.8	6 14 40.42	8.44					
46	Mars . . .	N.P.	32.2	45.1	58.8	12.2	25.0	6 18 58.66	0.84	4 18.24	7.60			
47	Bessel . . .	396	11.0	24.2	37.5	50.6	3.5	6 20 37.36	8.57					
48	Mars . . .	S.F.	30.0	43.5	56.5	9.8	22.5	6 24 56.46	0.03	4 19.10	8.54			
49	Bessel . . .	396	42.0	55.2	8.3	21.7	34.5	6 27 8.34	8.61					
50	Mars . . .	N.P.	59.8	13.0	26.0	39.3	52.0	6 31 26.02	0.95	4 17.68	7.66			
51	Bessel . . .	396	57.0	10.2	23.4	36.8	49.5	6 33 23.38	9.31					
52	Mars . . .	S.F.	. .	29.7	42.5	56.0	8.5	6 37 42.57	0.73	4 19.19	8.58			
53	Bessel . . .	396	21.5	34.5	47.5	1.0	13.6	6 39 47.62	8.98					
54	Mars . . .	N.P.	39.0	52.1	5.4	18.6	31.3	6 44 5.28	+1.23	+4 17.66	−7.65			

Remarks.

Until the planet passed the meridian, there was much flickering light and unsteadiness of motion. No cloud visible, and only a dry haze over the valleys; yet, even stars near the zenith could not be seen with the distinctness of last night.

a More steady.

b An evident slip of the telescope in A. R. Rejected.

c Steady.

d Perfectly steady.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Thirteen transits .	5 20 42.08	+4 19.429	−7.498	=2 26.14
Mean S. F. . .	Thirteen transits . .	5 21 34.61	+4 20.638	−8.451	=2 44.71

	s.
Correction for chronometer at 5h 21m	−56.68
Correction for chronometer at 5h 22m	−56.68

	h. m. s.
Santiago sid. time N. P.	5 19 45.40
Santiago sid. time S. F.	5 20 37.93
Interval	52.53

	″
Δ P. F. limbs in A. R. reduced to arc . . .	18.13
Variation of A. R. in 53s.	+0.22
Observed P. F. diameter	18.35

	″
Δ N. S. limbs micr. in rev.	0.953 = 18.57
Variation of declination in 53s. . . .	−0.04
Corr. for diam. of micr. wires . . .	−2.20
Observed N. S. diameter	16.33

	″
Δ ρ at 5h 18m	0.16
Δ ρ at 5h 18m	0.18

JANUARY 17, 1850.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	396	55.8	9.2	22.2	35.7	48.5	3 48 22.28	+7.14			28.045	71.1	59.9
2	Mars . . .	N.P.	54.7	8.0	21.0	34.3	46.8	3 52 20.96	—3.20	+3 58.68	—10.34			
3	Bessel . . .	396	59.0	12.5	25.5	38.9	51.5	3 54 25.48	+3.72			Ther. att. 70°.7		
4	Mars . . .	S.F.	58.5	11.7	24.8	38.3	51.0	3 58 24.86	—7.56	3 59.38	11.28	Bar. red. to 32° F.		
5	Bessel . . .	396	29.0	42.3	55.5	9.0	21.7	4 0 55.50	+4.17			27.931		
6	Mars . . .	N.P.	27.3	40.5	53.6	7.0	19.8	4 4 53.64	—6.24	3 58.14	10.41			
7	Bessel . . .	396	28.3	41.5	54.5	7.9	19.6	4 6 54.36	+4.39					
8	Mars . . .	S.F.	27.5	40.8	54.0	7.2	20.0	4 10 53.90	—6.98	3 59.54	11.37			
9	Bessel . . .	396	23.8	37.0	50.2	3.5	16.2	4 12 50.14	+4.65					
10	Mars . . .	N.P.	. .	35.2	48.2	1.4	14.3	4 16 48.17	—5.68	3 58.03	10.33			
11	Bessel . . .	396	7.6	20.6	33.8	47.4	0.2	4 18 33.92	+4.91					
12	Mars . . .	S.F.	6.6	19.8	33.0	46.3	59.0	4 22 32.94	—6.44	3 59.02	11.35			
13	Bessel . . .	396	51.5	4.9	18.1	31.2	44.0	4 24 17.94	+5.05					
14	Mars . . .	N.P.	49.5	2.5	15.5	28.8	41.3	4 28 15.52	—5.40	3 57.58	10.45			
15	Bessel . . .	396	10.5	24.3	37.3	51.5	3.5	4 34 37.42	+5.30					
16	Mars . . .	S.F.	9.7	23.0	36.0	49.5	2.2	4 38 36.08	—6.15	3 58.66	11.45			
17	Bessel . . .	396	1.0	14.2	27.3	40.5	53.2	4 40 27.24	+5.50					
18	Mars . . .	N.P.	58.3	11.4	24.6	38.0	50.8	4 44 24.62	—4.97	3 57.38	10.47			
19	Bessel . . .	396	14.6	27.8	41.0	54.3	7.0	4 48 40.94	+5.74					
20	Mars . . .	S.F.	13.0	26.0	39.2	52.5	5.2	4 52 39.18	—5.73	3 58.24	11.47			
21	Bessel . . .	396	0.1	13.3	26.3	39.6	52.3	4 54 26.32	+6.09					
22	Mars . . .	N.P.	56.0	9.5	23.0	36.5	49.2	4 58 22.84	—4.30	3 56.52	10.39			
23	Bessel . .	396	2.3	15.5	28.2	41.8	54.5	5 0 28.46	+6.28					
24	Mars . . .	S.F.	0.2	13.4	26.5	40.0	52.6	5 4 26.54	—5.21	3 58.08	11.49			
25	Bessel . . .	396	34.0	47.2	0.2	13.7	26.5	5 6 0.32	+6.43					
26 *a*	Mars . . .	N.P.	31.0	44.2	57.5	10.7	23.5	5 9 57.38	—4.09	3 57.06	10.52			
27	Bessel . . .	496	13.3	26.5	39.5	53.0	5.6	5 11 39.58	+5.72					
28	Mars . . .	S.F.	11.5	24.7	37.9	51.0	3.8	5 15 37.78	—5.84	3 58.20	11.56			
29	Bessel . . .	396	58.0	11.8	24.2	37.4	50.5	5 17 24.38	+5.66					
30 *b*	Mars . . .	N.P.	55.3	8.5	21.6	34.8	47.5	5 21 21.54	—4.90	3 57.16	10.56			
31	Bessel . . .	396	35.0	48.2	1.5	14.7	27.5	5 23 1.38	+5.76					
32	Mars . . .	S.F.	33.3	46.5	59.5	13.0	25.5	5 26 59.56	—5.67	3 58.18	11.43			
33	Bessel . . .	396	23.5	36.5	49.8	3.2	16.0	5 28 49.80	+5.90					
34	Mars .	N.P.	20.2	33.5	46.5	0.0	12.7	5 32 46.58	—4.66	3 56.78	10.56			
35	Bessel . . .	396	6.5	20.0	33.0	46.5	59.0	5 34 33.00	+5.87					
36	Mars . . .	S.F.	4.4	18.0	31.0	44.5	57.2	5 38 31.02	—5.54	3 58.02	11.41			
37 *c*	Bessel . . .	396	12.0	25.0	39.0	52.5	5.2	5 40 38.74	+6.08					
38 *d*	Mars . . .	N.P.	9.5	22.8	35.8	49.0	1.8	5 44 35.78	—4.56	3 57.04	10.64			
39	Bessel . . .	396	13.6	27.0	40.0	53.4	6.1	5 46 40.02	+6.16					
40	Mars . . .	S F.	11.5	24.7	37.8	51.2	3.8	5 50 37.80	—5.39	3 57.78	11.55			
41	Bessel . . .	396	2.0	15.2	28.2	41.5	54.2	5 52 28.22	+6.26					
42	Mars . . .	N.P.	58.2	11.4	24.6	37.8	50.5	5 56 24.50	—4.37	3 56.28	10.63			
43	Bessel . . .	396	56.3	9.5	22.6	36.0	48.5	5 58 22.58	+6.28					
44	Mars . . .	S.F.	53.8	7.2	20.2	33.5	46.2	6 2 20.18	—5.27	3 57.60	11.55			
45	Bessel . . .	396	43.7	57.2	10.3	23.5	36.2	6 4 10.18	+6.22					
46	Mars . . .	N.P.	40.2	53.4	6.5	19.8	32.5	6 8 6.58	—4.46	+3 56.40	—10.68			

JANUARY 17, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 396	24.0	37.3	50.5	3.8	16.5	6 9 50.52	+6.39			28.045	71.1	59.9
48	Mars . . . S.F.	21.3	34.5	47.8	1.2	13.6	6 13 47.68	−5.21	+3 57.16	−11.60			
49	Bessel . . . 396	21.3	34.5	47.5	1.0	13.7	6 15 47.60	+6.33			Ther. att. 70°.7		
50 *e*	Mars . . . N.P.	17.5	30.5	43.5	57.0	9.6	6 19 43.62	−4.29	3 56.02	10.62	Bar. red. to 32° F.		
51	Bessel . . . 396	2.3	15.5	28.6	42.2	54.5	6 21 28.62	+6.47			27.931		
52	Mars . . . S.F.	59.5	12.5	25.6	38.8	51.5	6 25 25.58	−5.17	3 56.96	11.64			
53	Bessel . . . 396	44.0	57.5	10.5	24.0	36.5	6 27 10.50	+6.58					
54	Mars . . . N.P.	39.8	53.0	6.2	19.5	32.2	6 31 6.14	−4.10	3 55.64	10.68			
55	Bessel . . . 396	48.5	2.0	15.5	38.8	41.2	6 37 15.20	+6.30					
56	Mars . . . S.F.	45.2	59.0	12.0	25.5	38.2	6 41 11.98	−5.35	3 56.78	11.65			
57 *f*	Bessel . . . 396	13.0	26.0	39.3	52.8	5.5	6 44 39.22	+6.90					
58	Mars . . . N.P.	8.8	21.8	35.0	48.2	1.0	6 48 34.96	−3.80	3 55.74	10.70			
59	Bessel . . . 396	35.5	48.8	2.0	15.5	28.0	6 50 1.96	+6.28					
60	Mars . . . S.F.	32.0	45.2	58.5	11.8	24.5	6 53 58.40	−5.49	+3 56.44	−11.77			

Remarks.

Mars was extremely unsteady and flaring during the early part of the evening; but shortly after passing the meridian, and until the close, all the measures were made under favorable circumstances.

a More steady.
b Good.
c Recorded 13*s*. at wire A.
d Very steady.
e Fine.
f Recorded 6*h*. 43*m*.

Results.

		h. m. s.
Mean N. P. . .	Fifteen transits . . .	5 19 50.85
Mean S. F. . .	Fifteen transits . . .	5 26 24.23

m. s.	Rev.	′ ″
+3 56.963	−10.532	=3 25.33
+3 58.003	−11.505	=3 44.23

	h. m.	m. s.
Correction for chronometer at	5 20 . .	−1 0.01
Correction for chronometer at	5 26 . . .	−1 0.02

	h. m. s.
Santiago sid. time N. P.	5 18 50.84
Santiago sid. time S. F.	5 25 24.21
Interval	6 33.37

	″
Δ P. F. limbs in A. R. reduced to arc . . .	15.60
Variation of A. R. in 6*m*. 33*s*.	+ 1.40
Observed P. F. diameter	17.00

	″
Δ N. S. limbs micr. in rev.	0.973 = 18.96
Variation of declination in 6*m*. 33*s*. .	− 0.26
Corr. for diam. of micr. wires . . .	− 2.20
Observed N. S. diameter	16.50

	h. m.	″
Δ ρ at	5 17	0.22
Δ ρ at	5 23	0.24

JANUARY 18, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 396	13.2	26.2	39.5	53.0	5.7	4 0 39.52	+5.91			28.082	70.5	55.4
2	Mars . . . N.P.	51.4	5.5	18.5	31.8	44.5	4 4 18.34	−7.41	+3 38.82	−13.32			
3	Bessel . . . 396	17.5	30.5	43.5	57.2	7.8	4 6 43.70	+5.59			Ther. att. 72°.4		
4	Mars . . . S.F.	. .	11.0	23.8	37.2	50.0	4 10 23.90	−8.69	3 40.20	14.28	Bar. red. to 32° F.		
5 *a*	Bessel . . . 396	15.0	28.5	41.5	55.0	7.5	4 31 41.50	+6.09			27.962		
6	Mars . . . N.P.	53.5	7.2	20.2	33.4	46.0	4 35 20.06	−7 23	+3 38.56	−13.32			

JANUARY 18, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
7	Bessel . . . 396	6.0	19.3	32.3	46.0	58.3	4 37 32.38	+6.20			28.082	70.5	55.4
8	Mars . . . S.F.	45.5	59.0	12.0	25.5	38.2	4 41 12.04	—8.06	+3 39.66	—14.26			
9	Bessel . . . 396	18.5	31.7	44.8	58.0	10.5	4 42 44.70	+6.14			Ther. att. 72.°4 Bar. red. to 32° F. 27.962		
10	Mars . . . N.P.	56.4	9.5	22.6	36.0	48.8	4 46 22.66	—7.21	3 37.96	13.35			
11	Bessel . . . 396	54.5	8.0	21.2	34.6	47.3	4 48 21.12	+6.44					
12	Mars . . . S.F.	34.3	47.5	0.7	14.0	26.5	4 52 0.60	—7.89	3 39.48	14.33			
13	Bessel . . . 396	11.3	24.5	37.8	51.1	3.7	4 53 37.68	+6.67					
14	Mars . . . N.P.	. .	. .	16.0	29.5	42.2	4 57 16.06	—6.77	3 38.38	13.44			
15	Bessel . . . 396	29.5	42.5	55.5	9.0	22.0	4 59 55.74	+6.96					
16	Mars . . . S.F.	7.2	20.2	33.5	46.5	59.2	5 3 33.32	—7.43	3 37.58	14.39			
17	Bessel . . . 396	57.7	10.8	24.0	37.5	50.2	5 5 24.04	+7.10					
18	Mars . . . N.P.	34.5	48.2	1.7	14.8	27.5	5 9 1.34	—6.32	3 37.30	13.42			
19	Bessel . . . 396	23.2	36.4	49.8	3.0	15.6	5 10 49.60	+7.27					
20	Mars . . . S.F.	2.5	15.5	28.7	42.0	54.8	5 14 28.70	—7.22	3 39.10	14.49			
21	Bessel . . . 396	50.0	4.0	16.8	30.5	43.2	5 16 16.90	+7.36					
22	Mars . . . N.P.	29.3	42.5	55.5	8.7	21.5	5 19 55.50	—6.07	3 38.60	13.43			
23	Bessel . . . 396	16.3	29.4	42.5	56.0	8.7	5 21 42.58	+7.50					
24	Mars . . . S.F.	55.5	8.5	21.7	35.1	47.7	5 25 21.70	—6.89	3 39.12	14.39			
25	Bessel . . . 396	47.5	0.5	13.8	27.2	40.0	5 27 13.80	+7.72					
26	Mars . . . S.F.	26.7	. .	53.0	6.2	19.0	5 30 52.94	—6.72	3 39.14	14.44			
27	Bessel . . . 396	3.0	16.5	29.7	43.0	55.7	5 33 29.58	+7.86					
28	Mars . . . N.P.	41.0	54.3	7.4	20.5	33.5	5 37 7.34	—5.46	3 37.76	13.32			
29	Bessel . . . 396	46.7	0.0	13.0	26.3	39.0	5 39 13.00	+8.02					
30	Mars . . . N.P.	24.5	37.8	50.8	4.5	17.0	5 42 50.92	—5.43	3 37.92	13.45			
31	Bessel . . . 396	4.0	17.7	30.2	43.8	56.5	5 44 30.44	+8.03					
32	Mars . . . S.F.	43.2	56.4	9.4	23.0	35.6	5 48 9.52	—6.41	3 39.08	14.44			
33	Bessel . . . 396	40.5	54.0	7.0	20.5	33.0	5 50 7.00	+8.20					
34	Mars . . . N.P.	18.8	31.8	45.0	58.3	11.2	5 53 45.02	—5.37	3 38.02	13.57			
35	Bessel . . . 396	4.2	17.5	30.5	44.0	56.5	5 55 30.54	+8.37					
36	Mars . . . S.F.	43.2	56.5	9.2	22.5	35.5	5 59 9.38	—6.22	3 38.84	14.59			
37	Bessel . . . 396	25.0	38.0	51.2	4.5	17.0	6 0 51.14	+7.05					
38	Mars . . . N.P.	2.5	15.5	28.5	42.0	54.5	6 4 28.60	—6.54	3 37.46	13.59			
39	Bessel . . . 396	45.0	58.5	11.5	24.8	37.5	6 6 11.46	+7.98					
40	Mars . . . S.F.	23.7	37.0	50.2	3.5	16.2	6 9 50.12	—6.76	3 38.66	14.74			
41	Bessel . . . 396	42.3	55.5	8.5	22.0	34.8	6 12 8.62	+7.16					
42	Mars . . N.P.	19.5	32.5	45.8	59.4	12.2	6 15 45.88	—6.41	3 37.26	13.57			
43	Bessel . . . 396	8.2	21.5	34.5	48.0	0.7	6 17 34.58	+7.20					
44	Mars . . . S.F.	46.5	0 0	13.0	26.5	39.2	6 21 13.04	—7.31	3 38.46	14.51			
45	Bessel . . . 396	14.5	27.7	40.8	54.1	7.0	6 23 40.82	+7.19					
46	Mars . . . N.P.	51.0	4.5	17.5	31.0	44.0	6 27 17.60	—6.39	3 36.82	13.58			
47	Bessel . . . 396	0.5	13.5	26.5	40.2	53.0	6 29 26.74	+7.14					
48	Mars . . . S.F.	38.5	51.5	4.5	18.2	31.0	6 33 4.74	—7.39	+3 38.00	—14.53			

Remarks.

A most unfavorable night for observations, both objects being very unsteady throughout. One or two of the measures towards the close can be regarded as "good;" the others "fair" only.

a Micrometer recorded +5.09 rev.

JANUARY 18, 1850—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	Twelve transits	5 24 27.44	+3 37.905	—13.447	=4 22.08
Mean S. F.	Twelve transits	5 29 6.67	+3 38.943	—14.449	=4 41.61

	h. m.	m. s.
Correction for chronometer at	5 25	—1 3.31
Correction for chronometer at	5 29	—1 3.32

	h. m. s.
Santiago sid. time N. P.	5 23 24.13
Santiago sid. time S. F.	5 28 3.35
Interval	4 39.22

	″
Δ P. F. limbs in A. R. reduced to arc	15.57
Variation of A. R. in 4*m*. 39*s*.	+ 0.84
Observed P. F. diameter	16.41

	″
Δ N. S. limbs micr. in rev.	1.002=19.53
Variation of declination in 4*m*. 39*s*.	— 0.19
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	17.14

	h. m.	″
Δ ρ at	5 22	0.28
Δ ρ at	5 26	0.30

JANUARY 19, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars	N.P.	12.7	26.0	38.8	52.3	4.8	4 48 38.92	+10.87			28.064	67.5	56.0
2	Bessel	405	14.0	27.5	40.5	54.0	6.5	4 52 40.50	— 5.54	—4 1.58	+16.41	Ther. att. 69°.2		
3	Mars	S.F.	41.5	54.5	7.5	21.0	33.5	5 12 7.60	+ 7.26			Bar. red. to 32° F.		
4	Bessel	405	. .	55.5	8.5	21.6	34.2	5 16 8.35	— 8.19	—4 0.75	+15.45	27.959		

Remarks.

Much dry haze, with light cirri, and an extremely minute star, combined to frustrate efforts to observe. There is also a difference in the observed and computed R. A. of the star, amounting to more than fifteen seconds; and we cannot examine it for want of a copy of Bessel's Zones.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	One transit	4 48 38.92	—4 1.580	+16.410	=5 19.83
Mean S. F.	One transit	5 12 7.60	—4 0.750	+15.450	=5 1.12

	h. m.	m. s.
Correction for chronometer at	4 49	—1 6.52
Correction for chronometer at	5 12	—1 6.57

	h. m. s.
Santiago sid. time N. P.	4 47 32.40
Santiago sid. time S. F.	5 11 1.03
Interval	23 28.63

	″
Δ P. F. limbs in A. R. reduced to arc	12.45
Variation of A. R. in 23*m*. 29*s*.	+ 3.29
Observed P. F. diameter	15.74

	″
Δ N. S. limbs micr. in rev.	0.960 = 18.71
Variation of declination in 23*m*. 29*s*.	— 0.86
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	15.65

	h. m.	″
Δ ρ at	4 50	0.34
Δ ρ at	5 13	0.32

JANUARY 20, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	44.5	57.5	10.8	24.0	36.8	4 23 10.72	+6.92			28.060	68.0	56.2
2	Bessel . . . 405	57.7	10.7	24.2	37.5	50.0	4 27 24.02	—6.73	—4 13.30	+13.65			
3	Mars . . . S.F.	4.0	17.5	30.5	43.6	56.5	4 29 30.42	+6.39			Ther. att. 66°.0 Bar. red. to 32° F. 27.959		
4	Bessel . . . 405	16.3	29.5	42.5	56.0	8.5	4 33 42.56	—6.40	4 12.14	12.79			
5	Mars . . . N.P.	54.8	8.0	21.5	34.8	47.3	4 37 21.28	+7.67					
6	Bessel . . . 405	8.3	21.3	34.5	48.0	0.8	4 41 34.58	—5.97	4 13.30	13.64			
7	Mars . . . S.F.	44.6	57.6	11.0	24.3	37.0	4 43 10.90	+7.07					
8	Bessel . . . 405	56.5	10.0	23.0	36.4	49.1	4 47 23.00	—5.71	4 12.10	12.78			
9	Mars . . . N.P.	40.5	53.7	6.8	20.2	33.0	4 49 6.84	+8.21					
10	Bessel . . . 405	. .	6.8	19.8	33.2	46.0	4 53 19.85	—5.41	4 13.01	13.62			
11	Mars . . . S.F.	1.6	15.0	28.0	41.2	54.0	4 55 27.96	+5.97					
12	Bessel . . . 405	. .	27.5	40.5	53.8	6.5	4 59 40.48	—6.74	4 12.52	12.71			
13	Mars . . . N.P.	58.0	11.2	24.3	37.6	50.5	5 1 24.32	+7.09					
14	Bessel . . . 405	11.5	24.5	38.0	51.0	3.8	5 5 37.76	—6.47	4 13.44	13.56			
15	Mars . . . S.F.	51.6	5.0	18.0	31.5	44.2	5 7 18.06	+6.38					
16	Bessel . . . 405	4.3	17.5	30.5	44.0	56.5	5 11 30.56	—6.36	4 12.50	12.74			
17	Mars . . . N.P.	42.5	55.8	9.2	22.4	35.1	5 13 9.00	+7.48					
18	Bessel . . . 405	55.5	9.0	22.5	36.0	48.5	5 17 22.30	—6.05	4 13.30	13.53			
19	Mars . . . S.F.	15.0	28.2	41.2	54.5	7.5	5 19 41.28	+7.01					
20	Bessel . . . 405	27.5	40.7	53.8	7.0	20.0	5 23 53.80	—5.68	4 12.52	12.69			
21	Mars . . . N.P.	53.5	6.5	19.8	33.2	46.0	5 26 19.80	+7.92					
22	Bessel . . . 405	7.5	20.5	33.5	46.8	59.5	5 30 33.56	—5.60	4 13.76	13.52			
23	Mars . . . S.F.	48.5	1.5	14.8	28.0	40.7	5 32 14.70	+7.17					
24	Bessel . . . 405	1.5	14.5	27.5	40.8	53.5	5 36 27.56	—5.55	—4 12.86	+12.92			

Remarks.

The night is extremely favorable for observations. A rather low temperature, and many cirri driving steadily from N.W. all day, evidencing that the S.W. wind, which prevailed here at the same time, was purely local. No sign of a cloud visible a few minutes after sunset, but the star is so excessively small that it does not bear as great illumination as is necessary for satisfactory measures.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Six transits . . .	4 55 5.33	— 4 13.352	+ 13.587 . . .	= 4 24.81
Mean S. F. . . .	Six transits . . .	5 1 13.88	— 4 12.440	+ 12.772 . . .	= 4 8.93

	m. s.
Correction for chronometer at 4h 55m . . .	— 1 9.82
Correction for chronometer at 5h 1m . . .	— 1 9.83

	h. m. s.
Santiago sid. time N. P.	4 53 55.51
Santiago sid. time S. F.	5 0 4.05
Interval	6 8.54

	″
Δ P. F. limbs in A. R. reduced to arc . . .	13.68
Variation of A. R. in 6*m*. 8*s*.	+ 0.64
Observed P. F. diameter	14.32

	″
Δ N. S. limbs micr. in rev.	0.815 = 15.88
Variation of declination in 6*m*. 8*s*. .	— 0.21
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	13.47

h. m.	″
Δ ρ at 4 56	0.28
Δ ρ at 5 2	0.26

JANUARY 21, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	36.0	49.2	2.4	15.5	28.4	4 20 2.30	+5.00			28.144	67.6	54.9
2	Bessel . . . 405	57.0	10.5	23.8	37.5	50.0	4 24 23.76	—5.96	—4 21.46	+10.96			
3	Mars . . . S.F.	34.5	47.6	1.0	14.3	27.2	4 27 0.92	+4.75			Ther. att. 68°.3 Bar. red. to 32° F. 28.037		
4	Bessel . . . 405	55.0	8.5	21.5	35.0	48.0	4 31 21.60	—5.48	4 20.68	10.23			
5	Mars . . . N.P.	6.3	19.5	32.5	45.8	58.7	4 33 32.56	+5.82					
6	Bessel . . . 405	28.0	41.3	54.5	7.7	20.5	4 37 54.40	—5.22	4 21.84	11.04			
7	Mars . . . S.F.	47.0	0.3	13.3	26.6	39.4	4 40 13.32	+5.10					
8	Bessel . . . 405	7.2	20.5	33.5	46.8	59.5	4 44 33.50	—5.06	4 20.18	10.16			
9	Mars . . . N.P.	50.5	3.5	16.5	30.0	42.8	4 47 16.66	+6.21					
10	Bessel . . . 405	11.2	25.0	38.0	51.3	4.3	4 51 37.96	—4.87	4 21.30	11.08			
11	Mars . . . S.F.	22.5	35.5	48.6	2.0	14.6	4 53 48.64	+5.57					
12	Bessel . . . 405	42.0	55.5	8.5	21.8	34.5	4 58 8.46	—4.57	4 19.82	10.14			
13	Mars . . N.P.	45.7	59.0	12.1	25.7	38.3	5 0 12.16	+6.63					
14	Bessel . . . 405	7.5	21.0	34.0	47.5	0.2	5 4 34.04	—4.48	4 21.88	11.11			
15	Mars . . . S.F.	42.2	55.5	8.5	21.8	34.5	5 7 8.50	+5.93					
16	Bessel . . . 405	2.5	15.5	29.0	42.5	55.0	5 11 28.90	—4.19	4 20.40	10.12			
17	Mars . . . N.P.	16.0	29.3	42.5	55.8	8.5	5 13 42.42	+7.01					
18	Bessel . . . 405	37.0	50.3	4.0	17.5	30.2	5 18 3.60	—3.97	4 21.18	10.98			
19	Mars . . . S.F.	9.5	23.0	36.0	49.5	2.2	5 21 36.04	+6.29					
20	Bessel . . . 405	30.3	43.5	56.6	10.0	22.7	5 25 56.62	—3.79	4 20.58	10.08			
21	Mars . . . N.P.	34.8	48.0	1.2	14.5	27.2	5 28 1.14	+4.40					
22	Bessel . . . 405	. .	9.5	22.6	36.0	48.8	5 32 22.63	—6.57	4 21.49	10.97			
23	Mars . . . S.F.	42.0	55.3	8.5	21.9	34.5	5 35 8.44	+3.59					
24	Bessel . . . 405	. .	15.8	29.0	42.4	55.0	5 39 28.95	—6.47	4 20.51	10.06			
25	Mars . . . N.P.	. .	4.5	17.5	30.5	43.5	5 43 17.40	+4.66					
26	Bessel . . . 405	12.5	26.0	39.0	52.2	5.2	5 47 38.98	—6.57	4 21.58	11.23			
27	Mars . . . S.F.	40.5	53.8	6.8	20.3	33.0	5 51 6.88	+4.04					
28	Bessel . . . 405	1.0	14.5	27.5	41.0	53.5	5 55 27.50	—6.09	4 20.62	10.13			
29	Mars . . . N.P.	1.7	15.0	28.0	41.5	54.7	5 59 28.18	+4.80					
30	Bessel . . . 405	24.5	37.5	. .	4.5	17.0	6 3 50.63	—6.09	4 22.45	10.89			
31	Mars . . . S.F.	8.4	21.5	34.5	48.0	0.5	6 12 34.58	+4.14					
32	Bessel . . . 405	29.5	43.0	56.0	9.5	22.0	6 16 56.00	—6.01	4 21.42	10.15			
33	Mars . . . N.P.	0.5	13.5	26.6	40.2	52.8	6 20 26.72	+5.37					
34	Bessel . . . 405	22.7	36.0	49.2	2.5	15.3	6 24 49.14	—5.56	4 22.42	10.93			
35	Mars . . . S.F.	24.2	37.5	50.5	3.8	16.5	6 28 50.50	+4.31					
36	Bessel . . . 405	45.5	58.5	12.0	25.5	38.2	6 33 11.94	—5.64	—4 21.44	+9.95			

Remarks.

Although a tolerably favorable night, the measures are by no means satisfactory. The comparing star is so extremely minute as to be obscured under light sufficient for proper illumination of the wires. I cannot think it above the 11th or 12th magnitude.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Nine transits . . .	5 16 13.28	—4 21.733	+11.021	=3 34.80
Mean S. F. . . .	Nine transits . . .	5 24 9.76	—4 20.628	+10.113	=3 17.10

JANUARY 21, 1850—Continued.

Results—Continued.

	h. m.	m. s.
Correction for chronometer at	5 16	—1 13.16
Correction for chronometer at	5 24	—1 13.18

	h. m. s.
Santiago sid. time N. P.	5 15 0.12
Santiago sid. time S. F.	5 22 56.58
Interval	7 56.46

	″
Δ P F. limbs in A. R. reduced to arc	16.57
Variation of A. R. in 7*m.* 56*s.*	+ 0.54
Observed P. F. diameter	17.11

	″
Δ N. S. limbs micr. in rev.	0.908 = 17.70
Variation of declination in 7*m.* 56*s.*	— 0.27
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	15.23

Δ ρ at 5 h. 17 m. . . . 0.23″

Δ ρ at 5 h. 25 m. . . . 0.21″

JANUARY 22, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	50.5	4.0	17.5	30.5	43.2	4 10 17.14	+4.47			28.078	69.4	52.7
2	Bessel . . . 405	. .	30.0	43.5	56.5	9.2	4 14 43.20	—4.11	—4 26.06	+8.58			
3	Mars . . . S.F.	48.3	1.5	14.7	28.0	40.6	4 17 14.62	+3.53			Ther. att. 70°.0		
4	Bessel . . . 405	13.5	26.5	39.8	52.8	5.5	4 21 39.62	—4.11	4 25.00	7.64	Bar. red. to 32° F.		
5	Mars . . . N.P.	7.8	21.0	34.2	47.6	0.3	4 23 34.18	+4.77			27.965		
6	Bessel . . . 405	34.0	47.5	0.5	14.0	26.5	4 28 0.50	—3.91	4 26.32	8.68			
7	Mars . . . S.F.	27.5	40.8	54.0	7.5	20.3	4 29 54.02	+4.01					
8	Bessel . . . 405	. .	.0	19.5	32.8	45.5	4 34 19.35	—3.66	4 25.33	7.67			
9	Mars . . . N.P.	4.7	17.2	30.5	43.7	56.4	4 36 30.50	+5.20					
10	Bessel . . . 405	30.5	43.8	56.6	10.0	22.6	4 40 56.70	—3.49	4 26.20	8.69			
11	Mars . . . S.F.	24.5	37.8	51.0	4.3	17.0	4 42 50.92	+4.47					
12	Bessel . . . 405	49.8	3.2	16.3	29.6	42.4	4 47 16.26	—3.19	4 25.34	7.66			
13	Mars . . . N.P.	40.6	53.5	6.8	20.3	32.8	4 49 6.80	+5.58					
14	Bessel . . . 405	6.0	19.2	32.3	45.8	58.4	4 53 32.34	—2.98	4 25.54	8.56			
15	Mars . . . S.F.	12.8	26.0	39.0	52.3	5.2	4 55 39.06	+2.83					
16	Bessel . . . 405	36.0	49.2	2.5	15.8	28.3	5 0 2.36	—4.86	4 23.30	7.69			
17	Mars . . . N.P.	5.2	18.5	31.5	45.0	57.8	5 2 31.60	+3.87					
18	Bessel . . . 405	32.3	45.5	58.8	12.0	24.7	5 6 58.66	—4.67	4 27.06	8.54			
19	Mars . . . S.F.	4.5	18.0	31.0	44.4	57.0	5 9 31.18	+3.12					
20	Bessel . . . 405	30.3	43.5	56.6	10.0	22.8	5 13 56.64	—4.63	4 25.46	7.75			
21	Mars . . . N.P.	21.7	34.8	48.1	1.5	14.3	5 15 48.08	+4.05					
22	Bessel . . . 405	48.5	1.8	15.0	28.0	40.8	5 20 14.82	—4.44	4 26.74	8.49			
23	Mars . . . S.F.	0.5	13.5	26.8	40.3	53.0	5 22 26.82	+3.38					
24	Bessel . . . 405	26.5	39.5	52.8	6.3	19.0	5 26 52.82	—4.39	4 26.00	7.77			
25 *a*	Mars . . . N.P.	24.2	37.5	50.7	4.1	16.7	5 31 50.64	+4.30					
26	Bessel . . . 405	50.4	4.7	17.7	31.3	44.0	5 36 17.62	—4.23	4 26.98	8.53			
27 *b*	Mars . . . S.F.	28.0	41.3	54.5	7.8	20.7	5 38 54.46	+3.58					
28	Bessel . . . 405	54.5	7.5	21.0	34.3	47.0	5 43 20.86	—4.10	4 26.40	7.68			
29 *c*	Mars . . . N.P.	8.0	21.3	34.4	47.7	0.5	5 45 34.38	+4.42					
30	Bessel . . . 405	35.0	48.2	1.5	14.8	27.5	5 50 1.40	—3.97	4 27.02	8.39			
31	Mars . . . S.F.	29.8	43.2	56.3	9.8	22.5	5 51 56.32	+3.86					
32	Bessel . . . 405	56.2	9.3	22.5	35.8	48.3	5 56 22.42	—3.77	4 26.10	7.63			
33	Mars . . . N.P.	22.5	35.6	48.7	2.0	14.6	5 58 48.68	+4.69					
34	Bessel . . . 405	48.8	2.5	15.5	28.9	41.5	6 3 15.44	—3.65	—4 26.76	+8.34			

JANUARY 22, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
35	Mars . . . S.F.	51.8	5.2	18.3	31.6	44.5	6 5 18.28	+3.97			28.078	69.4	52.7
36	Bessel . . . 405	17.8	31.0	44.3	57.7	10.5	6 9 44.26	—3.55	—4 25.98	+7.52			
37	Mars . . . N.P.	33.2	46.2	59.5	12.5	25.2	6 11 59.32	+4.65			Ther. att. 70°.0 Bar. red. to 32° F. 27.965		
38	Bessel . . . 405	0.0	13.1	26.3	39.8	52.4	6 16 26.32	—3.64	4 27.00	8.29			
39	Mars . . S.F.	55.2	8.5	21.5	35.0	47.6	6 18 21.56	+4.09					
40	Bessel . . . 405	21.1	34.3	47.5	1.0	13.5	6 22 47.48	—3.50	4 25.92	7.59			
41	Mars . . . N.P.	37.5	50.7	3.7	17.2	30.0	6 25 3.82	+4.82					
42	Bessel . . . 405	4.5	17.8	30.5	44.0	57.0	6 29 30.76	—3.56	4 26.94	8.38			
43	Mars . . . S.F.	9.5	22.7	35.8	49.2	1.9	6 31 35.82	+4.02					
44	Bessel . . . 405	36.0	48.8	2.0	15.2	27.8	6 36 1.96	—3.52	4 26.14	7.54			
45	Mars . . . N.P.	43.8	57.0	10.1	23.5	36.3	6 38 10.14	+5.01					
46	Bessel . . . 405	10.4	23.8	37.5	50.7	3.5	6 42 37.18	—3.36	4 27.04	8.37			
47	Mars . . . S.F.	44.5	57.6	10.9	24.3	37.0	6 45 10.86	+4.17					
48	Bessel . . . 405	10.8	24.0	37.1	50.5	3.2	6 49 37.12	—3.37	—4 26.26	+7.54			

Remarks.

Very favorable for observations. The great difficulty is with the very small star; it was, however, a little more distinct than last night.

a Very steady. *c* Beautifully steady.

b Recorded 21.7*s.* at wire E.

Results.

		h. m. s.		m. s.	Rev.	′ ″
Mean N. P.	Twelve transits	5 24 6.27		— 4 26.638	+ 8.487	= 2 45.42
Mean S. F.	Twelve transits	5 30 44.50		— 4 25.602	+ 7.640	= 2 28.90

	h. m.	m. s.		h. m. s.
Correction for chronometer at	5 24	— 1 16.88	Santiago sid. time N. P.	5 22 49.39
Correction for chronometer at	5 31	— 1 16.90	Santiago sid. time S. F.	5 29 27.60
			Interval	6 38.21

	″		″
Δ P. F. limbs in A. R. reduced to arc	15.55	Δ N. S. limbs micr. in rev.	0.847 = 16.51
Variation of A. R. in 6*m*. 38*s*.	+ 0.21	Variation of declination in 6*m*. 38*s*.	— 0.21
Observed P. F. diameter	15.76	Corr. for diameter of micr. wires	— 2.20
		Observed N. S. diameter	14.10

h. m.	″	h. m.	″
Δ ρ at 5 25	0.18	Δ ρ at 5 32	0.16

JANUARY 23, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	14.8	27.0	40.2	53.5	6.2	4 23 40.34	+3.60			28.088	71.1	53.5
2	Bessel . . . 405	. .	55.0	7.5	. .	34.0	4 28 7.84	—2.68	—4 27.50	+6.28			
3	Mars . . . S.F.	26.8	40.0	53.3	6.5	19.5	4 30 53 22	+4.20			Ther. att. 71°.0 Bar. red. to 32° F. 27.972		
4	Bessel . . . 405	53.5	6.5	19.6	32.8	45.8	4 35 19.64	—1.15	4 26.42	5.35			
5	Mars . . . N.P.	20.2	33.0	46.4	59.5	12.1	4 37 46.24	+2.78					
6	Bessel . . . 405	47.5	0.5	13.8	27.3	40.0	4 42 13.82	—3.44	—4 27.58	+6.22			

JANUARY 23, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m s.	Rev.	Inches.	°	°
7	Mars . . . S.F.	19.5	32.5	45.5	58.5	11.2	4 51 45.44	+1.23			28.088	71.1	53.5
8	Bessel . . . 405	45.8	59.2	12.5	25.7	38.5	4 56 12.34	—4.13	—4 26.90	+5.36			
9	Mars . . . N.P.	46.8	0.0	13.0	26.5	39.2	4 58 13.10	+2.47			Ther. att. 71°.0		
10	Bessel . . . 405	14.5	27.5	40.8	54.0	6.5	5 2 40.66	—3.69	4 27.56	6.16	Bar. red. to 32° F.		
11	Mars . . . S F.	29.8	43.0	56.2	9.5	22.3	5 4 56.26	+1.89			27.972		
12	Bessel . . . 405	56.5	9.5	23.0	36.2	48.8	5 9 22.80	—3.52	4 26.54	5.41			
13	Mars . . . N.P.	27.5	40.5	53.7	7.0	19.5	5 10 53.64	+2.92					
14 *a*	Bessel . . . 405	. .	. .	21.6	35.0	47.5	5 15 21.54	—3.33	4 27.90	6.25			
15	Mars . . . S.F.	34.5	47.7	0.8	14.3	23.9	5 18 0.84	+2.21					
16	Bessel . . . 405	1.3	14.5	27.7	41.0	53.6	5 22 27.62	—3.11	4 26.78	5.32			
17	Mars . . . N.P.	0.6	13.9	26.9	40.4	53.1	5 24 26.98	+3.20					
18	Bessel . . . 405	28.5	41.5	55.0	8.3	21.0	5 28 54.86	—2.99	4 27.88	6.19			
19	Mars . . . S F.	47.9	1.0	14.3	27.5	40.3	5 31 14.20	+2.53					
20	Bessel . . . 405	14.8	28.0	41.0	54.5	7.2	5 35 41.10	—2.78	4 26.90	5.31			
21	Mars . . . N.P.	2.5	15.5	28.5	42.0	54.6	5 37 28.62	+3.55					
22	Bessel . . . 405	30.3	43.5	56.7	10.0	22.7	5 41 56.64	—2.55	4 28.02	6.10			
23	Mars . . . S.F.	14.0	27.5	40.5	53.8	6.5	5 43 40.56	+2.87					
24	Bessel . . . 405	41.2	54.5	7.5	21.0	33.6	5 48 7.56	—2.45	4 27.00	5.32			
25 *b*	Mars . . . S.F.	53.5	6.5	19.5	32.5	46.0	6 5 19.60	+2.77					
26	Bessel . . . 405	20.5	. .	46.5	59.7	13.0	6 9 46.59	—2.59	4 26.99	5.36			
27	Mars . . . N.P.	18.5	31.5	44.5	57.5	11.0	6 15 44.60	+3.44					
28	Bessel . . . 405	46.8	59.5	12.7	26.0	39.2	6 20 12.84	—2.69	4 28.24	6.13			
29	Mars . . . N.P.	38.3	50.5	4.2	17.2	30.5	6 23 4.14	+3.46					
30	Bessel . . . 405	6.3	18.5	32.5	45.5	58.5	6 27 32.26	—2.66	4 28.12	6.12			
31	Mars . . . S.F.	40.5	53.5	6.5	19.5	33.0	6 30 6.60	+2.85					
32	Bessel . . . 405	7.5	20.3	33.5	46.8	0.0	6 34 33.62	—2.48	4 27.02	5.33			
33	Mars . . . N.P.	9.9	22.5	36.0	49.0	2.5	6 37 35.98	+3.42					
34	Bessel . . . 405	38.0	50.8	4.2	17.3	30.5	6 42 4.16	—2.74	4 28.18	6.16			
35	Mars . . . S.F.	51.5	4.0	17.4	30.5	43.7	6 45 17.42	+2.67					
36	Bessel . . . 405	18.9	31.5	45.0	58.0	11.5	6 49 44.98	—2.61	—4 27.56	+5.28			

Remarks.

There were no marked peculiarities in the observations of to-night. The star was seen somewhat more distinctly.

a Recorded 22.6*s*. at wire C.

b Telescope reversed.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Six transits	5 2 4.82	— 4 27.740 . . .	+ 6.200	= 2 0.84
Mean S. F. . .	Six transits	5 10 5.09	4 26.757 . . .	5.345	1 44.17
Mean N. P. . .	Three transits . . .	6 25 28.24	4 28.180 . . .	6.137	1 59.60
Mean S. F. . .	Three transits . . .	6 26 54.54	— 4 27.190 . . .	+ 5.323	= 1 43.74

	h. m.	h. m. s.
Correction for chronometer at	5 2 . . —	1 20.59
Correction for chronometer at	5 10 . . —	1 20.52
Santiago sid. time N. P.		5 0 44.32
Santiago sid. time S. F.		5 8 44.57
Interval		8 0.25

	h. m.	h. m. s.
Correction for chronometer at	6 25 . . —	1 20.70
Correction for chronometer at	6 27 . . —	1 20.71
Santiago sid. time N. P.		6 24 7.54
Santiago sid. time S. F.		6 25 33.83
Interval		26.29

JANUARY 23, 1850—Continued.

Results—Continued.

	″
Δ P. F. limbs in A. R. reduced to arc . . .	14.74
Variation of A. R. in 8*m*.	— 0.04
Observed P. F. diameter	14.70

	″
Δ N. S. limbs micr. in rev.	0.855 = 16.66
Variation of declination in 8*m*. . . .	— 0.24
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	14.22

	″
Δ P. F. limbs in A. R. reduced to arc . . .	14.45
Variation of A. R. in 26*s*.	+ 0.00
Observed P. F. diameter	14.45

	″
Δ N. S. limbs micr. in rev.	0.814 = 15.86
Variation of declination in 26*s*. . . .	— 0.01
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	13.65

h. m.	″
Δ ρ at 5 3	0.13
Δ ρ at 5 11	0.11

h. m.	″
Δ ρ at 6 26	0.14
Δ ρ at 6 28	0.12

JANUARY 24, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . .	N.P.	32.4	46.0	59.0	12.7	25.4	4 18 59.10	+3 04			28.089	73.2	56.6
2	Bessel . . .	405	. .	11.0	24.4	37.8	51.0	4 23 24.45	—0.93	—4 25.35	+3.97			
3	Mars . . .	S.F.	45.8	59.5	12.5	25.5	39.0	4 40 12.46	+1.56			Ther. att. 71°.8 Bar. red. to 32° F. 27.971		
4	Bessel . . .	405	. .	24.3	37.3	50.7	3.5	4 44 37.35	—1.62	4 24.89	3.18			
5	Mars . . .	N.P.	14.5	28.0	41.0	54.3	7.0	4 47 40.96	+2.78					
6	Bessel . . .	405	40.0	53.5	7.0	20.2	33.2	4 52 6.78	—1.38	4 25.82	4.16			
7	Mars . . .	S.F.	37.0	50.3	3.4	16.7	29.5	4 54 3.38	+2.34					
8	Bessel . . .	405	2.5	15.3	28.3	41.5	54.2	4 58 28.36	—1.03	4 24.98	3.37			
9	Mars . . .	N.P.	9.8	23.0	36.1	49.5	2.3	5 0 36.14	+2.28					
10	Bessel . . .	405	35.8	49.0	2.3	15.5	28.3	5 5 2.18	—1.77	4 26.04	4.05			
11	Mars . . .	S.F.	52.5	5.8	18.8	32.2	45.0	5 7 18.86	+1.81					
12	Bessel . . .	405	17.5	31.0	44.0	57.2	9.7	5 11 43.88	—1.44	4 25.02	3.35			
13	Mars . . .	N.P.	4.3	17.4	30.5	43.8	56.5	5 13 30.50	+2.83					
14	Bessel . . .	405	30.2	43.3	56.4	9.8	22.5	5 17 56.44	—1.21	4 25.94	4.04			
15	Mars . . .	S.F.	24.3	37.5	50.5	4.0	16.8	5 19 50.62	+2.17					
16	Bessel . . .	405	49.5	2.6	15.7	29.1	41.6	5 24 15.70	—1.14	4 25.08	3.31			
17	Mars . . .	N.P.	38.5	51.8	4.8	18.2	31.0	5 26 4.86	+3.37					
18	Bessel . . .	405	4.5	17.8	31.0	44.3	57.0	5 30 30.92	—0.68	4 26.06	4.05			
19	Mars . . .	S.F.	3.5	16.8	29.8	43.2	55.8	5 32 29.82	+2.41					
20	Bessel . . .	405	28.3	21.7	54.6	8.0	20.6	5 36 54.64	—0.82	4 24.82	3.23			
21	Mars . . .	N.P.	33.5	47.0	0.0	13.3	26.0	5 38 59.96	+1.37					
22	Bessel . . .	405	59.5	12.7	26.2	39.5	52.2	5 43 26.02	—2.66	4 26.06	4.03			
23	Mars . . .	S.F.	54.8	8.0	21.2	34.5	47.3	5 45 21.16	+1.13					
24	Bessel . . .	405	20.0	33.2	46.5	59.5	12.0	5 49 46.24	—2.04	4 25.08	3.17			
25	Mars . . .	N.P.	10.6	23.8	36.8	50.3	2.8	5 51 36.86	+2.27					
26	Bessel . . .	405	26.6	49.8	2.7	16.2	28.9	5 56 2.84	—1.71	4 25.98	3.98			
27	Mars . . .	S.F.	46.5	0.0	13.0	26.4	39.1	5 58 13.00	+1.87					
28	Bessel . . .	405	11.5	25.6	38.2	51.5	4.3	6 2 38.22	—1.24	4 25.22	3.11			
29	Mars . . .	N.P.	13.2	26.4	39.4	52.8	5.5	6 4 39.46	+1.79					
30	Bessel . . .	405	39.0	52.2	5.5	18.8	31.4	6 9 5.38	—2.24	4 25.92	4.03			
31	Mars . . .	S.F.	28.8	42.0	55.3	8.5	21.4	6 10 55.18	+1.16					
32	Bessel . .	405	53.6	7.4	20.4	33.6	46.2	6 15 20.24	—1.91	—4 25.06	+3.07			

JANUARY 24, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
33	Mars . . . N.P.	7.7	20.8	33.8	47.1	0.0	6 17 33.90	+1.66			28.089	73.2	56.6
34	Bessel . . . 405	33.4	46.5	59.6	13.0	25.7	6 21 59.64	—2.32	—4 25.74	+3.98			
35	Mars . . . S.F.	0.7	13.8	26.8	40.3	53.0	6 24 26.92	+1.07			Ther. att. 71°.8		
36	Bessel . . . 405	25.8	39.0	52.1	5.5	18.3	6 28 52.14	—1.95	4 25.22	3.02	Bar. red. to 32° F.		
37	Mars . . . N.P.	26.0	39.2	52.3	5.5	18.5	6 30 52.30	+1.47			27.971		
38	Bessel . . . 405	51.8	4.8	18.0	31.5	44.2	6 35 18.06	—2.47	4 25.76	3.94			
39	Mars . . . S.F.	25.2	38.5	51.5	4.8	17.8	6 37 51.56	+1.22					
40	Bessel . . . 405	49.9	3.0	16.4	29.9	42.5	6 42 16.34	—1.83	4 24.78	3.05			
41	Mars . . . N.P.	58.2	11.5	24.8	37.8	50.8	6 41 24.62	+1.85					
42	Bessel . . . 405	24.0	37.3	50.5	4.0	16.7	6 48 50.50	—2.06	4 25.88	3.91			
43	Mars . . . S.F.	5.5	18.6	31.8	45.0	58.0	6 51 31.78	+1.25					
44	Bessel . . . 405	30.5	43.5	56.6	10.0	22.8	6 55 56.68	—1.84	—4 24.90	+3.09			

Remarks.

There has been but one more favorable night since the commencement of observations—that of December 17. Both objects are sharply defined, and are entirely free from flickering motion. Whether the star is variable or not it would be difficult to pronounce, yet it has certainly been better seen during the last two nights.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Eleven transits . .	5 37 43 51	—4 25.868	+4.013	=1 18.21
Mean S. F. . .	Eleven transits . .	5 45 39.53	—4 25.005	+3.177	=1 1.92

	s.		h. m. s.
Correction for chronometer at 5 38 (h. m.) . . .	—1 24.27	Santiago sid. time N. P.	5 36 19.24
Correction for chronometer at 5 46 . . .	—1 24.29	Santiago sid. time S. F.	5 44 15.24
		Interval	7 56.00

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	12.94	Δ N. S. limb micr. in rev.	0.836 = 16.29
Variation of A. R. in 7*m*. 56*s*.	— 0.32	Variation of declination in 7*m*. 56*s*. .	— 0.23
Observed P. F. diameter	12.62	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	13.86

	″		″
Δ ρ at 5 26 (h. m.)	0.06	Δ ρ at 5 38 (h. m.)	0.08

JANUARY 25, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α	Δ δ	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	12.0	25.7	38.4	51.7	4.5	4 21 38.46	+4.63			28.110	75.6	58.4
2	Bessel . . . 405	33.0	46.0	59.0	12.5	25.0	4 25 59.10	2.46	—4 20.64	+2.17			
3	Mars . . . S.F.	49.2	2.4	15.5	28.8	41.7	4 28 15.52	1.96			Ther. att. 75°.0		
4	Bessel . . . 405	. .	22.0	35.2	48.6	1.2	4 32 35.15	0.70	4 19.63	1 26	Bar. red. to 32° F.		
5	Mars . . . N.P.	4.8	17.9	31.3	44.6	57.5	4 34 31.22	2.46			27.983		
6	Bessel . . . 405	25.5	38.5	51.8	4.3	18.0	4 38 51.62	0.44	4 20.40	2.02			
7	Mars . . . S.F.	52.6	6.0	19.2	32.5	45.3	4 41 19.12	1.66					
8	Bessel . . . 405	11.5	25.2	38.8	52.1	4.8	4 45 38.48	+0.44	—4 19.36	+1.22			

JANUARY 25, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
9	Mars . . . N.P.	14.3	27.5	40.7	54.0	6.6	4 48 40.62	+3.79			28.110	75.6	58.4
10	Bessel . . . 405	. .	48.2	1.5	14.7	27.5	4 53 1.38	1.76	—4 20.76	+2.03			
11	Mars . . . S.F.	6.7	19.8	32.8	46.3	59.2	4 55 32.96	3.28			Ther. att. 70°.5		
12	Bessel . . . 405	27.2	39.5	52.6	6.0	18.8	4 59 52.82	2.11	4 19.86	1.17	Bar red. to 32° F.		
13	Mars . . . N.P.	11.1	24.2	37.5	50.8	3.5	5 1 37.42	4.45			27.983		
14	Bessel . . 405	31.8	45.0	58.0	11.4	24.2	5 5 58.08	2.42	4 20.66	2.03			
15	Mars . . . S.F.	26.5	39.7	52.7	6.3	19.0	5 7 52.84	3.80					
16	Bessel . . . 405	46.0	59.5	12.6	26.0	38.6	5 12 12.54	2.57	4 19.70	1.23			
17	Mars . . . N.P.	49.0	2.2	15.5	28.8	41.5	5 14 15.40	4.96					
18	Bessel . . . 405	9.1	22.6	36.0	49.3	2.0	5 18 35.80	2.85	4 20.40	2.11			
19	Mars . . . S.F.	29.3	42.6	55.8	9.2	21.8	5 20 55.74	3.68					
20	Bessel . . . 405	49.0	2.3	15.5	28.8	41.5	5 25 15.42	2.45	4 19.68	1.23			
21	Mars . . N.P.	47.5	0.6	13.8	27.3	40.0	5 27 13.84	4.64					
22	Bessel . . . 405	8.0	21.5	34.5	48.0	0.5	5 31 31.50	2.67	4 20.66	1.97			
23	Mars . . . S.F.	10.6	23.8	37.0	50.4	3.2	5 34 37.00	4.19					
24	Bessel . . . 405	30.0	43.5	56.5	9.8	22.7	5 38 56.50	3.00	4 19.50	1.19			
25	Mars . . . N.P.	48.7	1.9	15.1	28.2	41.0	5 43 14.98	5.17					
26	Bessel . . . 405	8.8	22.0	35.3	48.6	1.5	5 47 35.24	3.21	4 20.26	1.96			
27	Mars . . . S.F.	20.0	33.5	46.5	59.8	12.5	5 49 46.46	4.68					
28	Bessel . . . 405	39.5	52.8	6.0	19.2	32.0	5 54 6.10	3.52	4 19.64	1.16			
29	Mars . . . N.P.	28.5	41.6	54.7	8.0	20.8	5 55 54.72	5.82					
30	Bessel . . . 405	48.6	2.0	15.0	28.5	41.0	6 0 15.02	3.87	4 20.30	1.95			
31	Mars . . S.F.	21.5	34.6	47.7	1.2	13.8	6 2 47.76	2.82					
32	Bessel . . . 405	41.0	54.2	7.2	20.6	33.5	6 7 7.30	1.55	4 19.54	1.27			
33	Mars . . . N.P.	44.4	57.5	10.5	23.8	36.2	6 10 10.48	3.48					
34	Bessel . . . 405	4.5	17.8	30.9	44.3	57.0	6 14 30.90	1.51	4 20.42	1.97			
35	Mars . . . S.F.	13.0	26.3	39.4	52.8	5.5	6 17 39.40	2.56					
36	Bessel . . . 405	32.5	45.5	58.7	12.1	24.7	6 21 58.70	1.40	4 19.30	1.16			
37	Mars . . . N.P.	1.8	15.0	28.0	41.4	54.3	6 24 28.10	3.49					
38	Bessel . . . 405	21.8	35.1	48.4	1.8	14.5	6 28 48.32	1.55	4 20.22	1.94			
39	Mars . . . S.F.	22.5	35.8	48.8	2.3	14.9	6 30 48.86	2.70					
40	Bessel . . . 405	41.8	55.4	8.5	21.8	34.5	6 35 8.40	1.44	4 19.54	1.26			
41	Mars . . . N.P.	33.8	47.0	0.2	13.5	26.2	6 37 0.14	3.51					
42	Bessel . . . 405	54.0	7.2	20.5	34.0	46.5	6 41 20.44	1.55	4 20.30	1.96			
43	Mars . . . S.F.	6.8	19.8	32.8	46.2	58.8	6 43 32.88	2.52					
44	Bessel . . . 405	25.5	39.0	52.1	5.5	18.3	6 47 52.08	+1.29	—4 19.20	+1.23			

Remarks.

Very favorable for observations throughout, and the measures generally good except at first, when an excess of light rendered the star extremely indistinct.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Eleven transits . . .	5 28 58.67	— 4 20.451 . . .	+ 2.010 . .	= 0 39.17
Mean S. F. . .	Eleven transits . . .	5 35 44.41	— 4 19.541 . . .	+ 1.216	= 0 23.70

JANUARY 25, 1850—Continued.

Results—Continued.

	h. m.	m. s.
Correction for chronometer at	5 29	—1 27.36
Correction for chronometer at	5 36	—1 27.38

	h. m. s.
Santiago sid. time N. P.	5 27 31.31
Santiago sid. time S. F.	5 34 17.03
Interval	6 45.72

	″
Δ P. F. limbs in A. R. reduced to arc	13.65
Variation of A. R. in 6*m*. 46*s*.	— 0.50
Observed P. F. diameter	13.15

	″
Δ N. S. limbs micr. in rev. 0.794 =	15.47
Variation of declination in 6*m*. 46*s*.	— 0.18
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	13.09

	h. m.	″
Δ ρ at	5 30	0.04
Δ ρ at	5 36	0.02

JANUARY 26, 1850.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars	N.P.	59.5	13.5	25.6	39.0	51.6	4 32 25.84	+3.02			28.121	76.3	59.1
2	Bessel	405	10.5	24.5	37.5	50.8	3.5	4 36 37.36	2.70	—4 11.52	+0.32			
3 *a*	Mars	S.F.	13.7	27.0	40.0	53.5	6.2	4 38 40.08	2.56			Ther. att. 74°.3 Bar. red. to 32° F. 27,996		
4	Bessel	405	24.5	38.0	51.3	4.7	17.5	4 42 51.20	3.78	4 11.12	—1.22			
5 *b*	Mars	N.P.	59.2	11.8	25.0	38.5	50.8	4 45 25.06	4.41					
6	Bessel	405	10.3	21.0	37.0	50.0	3.0	4 49 36.86	4.19	4 11.80	+0.22			
7 *c*	Mars	S.F.	26.0	39.4	52.4	6.0	18.8	4 57 52.52	3.88					
8	Bessel	405	37.0	50.2	3.4	16.6	29.5	4 2 3.34	4.58	4 10.82	—0.70			
9	Mars	N.P	50.0	3.0	16.3	29.6	42.2	5 6 16.22	5.08					
10	Bessel	405	1.5	15.0	28.0	41.5	54.2	5 10 28.06	4.81	4 11.84	+0.27			
11	Mars	S.F.	43.2	56.5	9.5	23.0	35.6	5 12 9 56	4.50					
12 *d*	Bessel	405	54.0	7.5	20.5	33.8	46.5	5 16 20.46	5.23	4 10.90	—0.73			
13 *e*	Mars	N.P.	31.5	44.8	58.0	11.5	24.0	5 17 57.96	5.56					
14	Bessel	405	43.5	55.5	9.8	23.3	35.8	5 22 9.58	5.34	4 11.62	+0.22			
15	Mars	S.F.	46.0	59.2	12.5	25.7	38.4	5 25 12.36	4.95					
16	Bessel	405	56.8	10.0	23.3	36.6	49.0	5 29 23.14	5.78	4 10.78	—0.83			
17 *f*	Mars	N.P.	47.5	1.0	14.2	27.5	40.2	5 31 14.08	2.56					
18	Bessel	405	59.7	. .	26.3	39 5	53.0	5 35 26.35	2.30	4 12.27	+0.26			
19 *g*	Mars	S.F.	49.5	3.0	16.0	29.5	42.2	5 38 16.04	1.67					
20	Bessel	405	0.5	13.5	26.5	39.8	52.7	5 42 26.60	2.41	4 10.56	—0.74			
21	Mars	N.P.	46.8	0.1	13.1	26.3	38.9	5 44 13.04	2.45					
22	Bessel	405	58.5	11.8	24.5	38.0	50.7	5 48 24.70	2.30	4 11.66	+0.15			
23	Mars	S.F.	25.3	38.5	51.5	5.0	17.8	5 52 51.62	1.61					
24	Bessel	405	36.2	49.5	2.5	15.8	28.5	5 57 2.50	2.33	4 10.88	—0.72			
25 *h*	Mars	N.P.	19.5	32.8	46.0	59.5	12.1	5 58 45.98	2.62					
26	Bessel	405	31.2	44.5	57.5	11.0	23.6	6 2 57.56	2.49	4 11.58	+0.13			
27	Mars	S.F.	32.5	45.7	58.8	12.3	25.0	6 4 58.86	1.91					
28	Bessel	405	43.2	56.5	9.5	23.0	35.5	6 9 9.54	2.62	4 10.68	—0.71			
29	Mars	N.P.	19.5	33.5	46.8	0.2	13.1	6 10 46.62	2.55					
30	Bessel	405	31.8	45.0	58.5	11.8	24.5	6 14 58.32	2.48	4 11.70	+0.07			
31	Mars	S.F.	46.5	59.7	12.8	26.3	39.0	6 20 12.86	1.84					
32	Bessel	405	56.5	10.2	23.5	36.5	49.5	6 24 23.24	2.58	4 10.38	—0.74			
33 *i*	Mars	N.P.	55.5	9.0	21.8	35.3	47.8	6 27 21.88	2.86					
34	Bessel	405	. .	20.8	33.5	47.0	59.5	6 31 33.60	2.91	4 11.72	—0.05			
35	Mars	S.F.	24.8	38.0	51.0	4.5	17.2	6 33 51.10	2.25					
36	Bessel	405	35.0	48.5	2.0	15.5	27.8	6 38 1.76	+2.99	—4 10.66	—0.74			

JANUARY 26, 1850—Continued.

Remarks.

Much haze rendered the star almost invisible throughout the night.

a Telescope accidentally touched after observing Mars. Rejected.
b Cool fresh wind rising, changing the refraction rapidly.
c Flaring.
d Recorded 44.5*s*. at wire E.
e More distinct and steady.
f Flaring and unsteady.
g Very unsteady.
h Very steady.
i The light was changed.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean N. P.	Nine transits	5 30 29.63	—4 11.745	+0.177	=0 3.45
Mean S. F.	Nine transits	5 45 40.61	—4 10.708	—0.739	=0 14.40

h. m.	m. s.		h. m. s.
Correction for chronometer at 5 30	—1 30.45	Santiago sid. time N. P.	5 28 59.18
Correction for chronometer at 5 46	—1 30.48	Santiago sid. time S. F.	5 44 10.13
		Interval	15 10.95

	″		″
Δ P. F. limbs in A. R. reduced to arc	15.55	Δ N. S. limbs micr. in rev.	0.916=17.85
Variation of A. R. in 15*m*. 11*s*.	— 1.62	Variation of declination in 15*m*. 11*s*.	— 0.40
Observed P. F. diameter	13.93	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	15.25

h. m.	″	h. m.	″
Δ ρ at 5 31	0.00	Δ ρ at 5 46	0.01

JANUARY 27, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	44.5	58.0	11.5	24.8	37.5	4 17 11.26	+1.63			28.086	80.2	62.8
2 *a*	Bessel . . . 405	45.3	. .	11.6	25.2	37.7	4 21 11.62	3.19	—4 0.36	—1.56			
3	Mars . . . S.F.	6.1	19.3	32.4	45.8	58.2	4 24 32.36	1.15			Ther. att. 76°.0		
4	Bessel . . . 405	. .	18.5	. .	44.8	57.5	4 28 31.49	3.52	3 59.13	2.37	Bar. red. to 32° F. 27.955		
5	Mars . . . N.P.	2.4	15.5	28.6	41.8	54.6	4 30 28.58	2.14					
6	Bessel . . . 405	2.5	15.8	29.0	42.5	55.0	4 34 28.96	3.70	4 0.38	1.56			
7	Mars . . . S.F.	4.6	17.8	31.0	44.4	57.0	4 36 30.96	1.58					
8	Bessel . . . 405	4.3	17.5	30.8	44.2	56.6	4 40 30.68	3.83	3 59.72	2.25			
9	Mars . . . N.P.	50.8	4.0	17.3	30.6	43.5	4 42 17.24	2.22					
10	Bessel . . . 405	51.0	4.2	17.4	30.5	43.8	4 46 17.38	3.81	4 0.14	1.59			
11	Mars . . . S.F.	12.4	25.8	38.8	52.2	4.6	4 48 38.76	1.72					
12	Bessel . . . 405	11.3	24.6	37.5	51.0	3.2	4 52 37.52	4.08	3 58.76	2.36			
13	Mars . . . N.P.	31.8	45.2	58.2	11.6	24.3	4 54 58.22	2.72					
14	Bessel . . . 405	. .	45.8	58.8	12.0	25.0	4 58 58.80	4.39	4 0.58	1.67			
15 *b*	Mars . . . N.P.	29.8	43.0	56.0	9.5	22.2	5 0 56.10	2.96					
16	Bessel . . . 405	30.1	43.2	56.4	9.5	22.3	5 4 56.30	4.50	4 0.20	1.54			
17	Mars . . . N.P.	36.8	50.0	3.3	16.5	29.3	5 7 3.18	3.08					
18	Bessel . . . 405	36.8	50.1	3.2	16.5	29.0	5 11 3.12	4.67	3 59.94	1.59			
19	Mars . . . S.F.	55.3	8.5	21.5	34.8	47.7	5 13 21.56	1.00					
20	Bessel . . . 405	54 0	7.5	20.5	34.0	46.6	5 17 20.52	3.32	3 58.96	2.32			
21	Mars . . . N.P.	2.8	16.1	29.3	42.6	55.2	5 19 29.20	1.75					
22	Bessel . . . 405	2.5	. .	29.0	42.5	55.0	5 23 28.97	+3.36	—3 59.77	—1.61			

JANUARY 27, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
23	Mars . . .	S.F.	5.1	18.3	31.5	44.8	57.5	5 25 31.44	+1.18			28.086	80.2	62.8
24	Bessel . . .	405	. .	17.5	30.5	44.0	56.5	5 29 30.53	3.56	−3 59.09	−2.38			
25	Mars . . .	N.P.	12.2	25.7	38.8	52.2	4.5	5 31 38.68	2.10			Ther. att. 76.°0		
26	Bessel . . .	405	12.5	25.5	38.7	52.3	4.6	5 35 38.72	3.77	4 0.04	1.67	Bar. red. to 32° F.		
27	Mars . . .	S.F.	24.5	37.8	50.8	4.0	16.8	5 37 50.78	1.41			27.955		
28	Bessel . . .	405	23.0	36.2	49.5	3.0	15.5	5 41 49.44	3.84	3 58.66	2.43			
29	Mars . . .	N.P.	39.4	52.6	5.8	19.3	32.0	5 44 5.82	2.19					
30	Bessel . . .	405	39.3	52.5	5.5	18.8	31.8	5 48 5.58	3.88	3 59.76	1.79			
31	Mars . . .	S.F.	38.0	51.5	4.5	17.8	30.5	5 51 4.46	1.70					
32 *c*	Bessel . . .	405	37.3	50.5	3.5	. .	29.8	5 55 3.62	4.05	3 59.16	2.35			
33	Mars . . .	N.P.	16.8	30.4	43.3	56.8	9.5	5 56 43.36	2.33					
34	Bessel . . .	405	16.5	30.0	43.0	56.5	9.0	6 0 43.00	3.98	3 59.64	1.65			
35	Mars . . .	S.F.	11.0	24.4	37.4	50.5	3.5	6 2 37.36	1.55					
36	Bessel . . .	405	9.8	23.0	36.0	49.5	2.3	6 6 36.12	4.00	3 58.76	2.45			
37	Mars . . .	N.P.	7.4	20.5	33.5	46.8	59.5	6 8 33.54	2.33					
38	Bessel . . .	405	. .	19.5	32.8	46.3	59.0	6 12 32.80	4.00	3 59.26	1.67			
39	Mars . . .	S.F.	58.0	11.5	24.8	38.0	50.3	6 20 24.52	1.89					
40	Bessel . . .	405	57.0	10.2	23.5	37.0	49.8	6 24 23.50	+4.42	−3 58.98	−2.53			

Remarks.

An almost unvarying atmospheric condition throughout the observations. This rendered the image sharp, and the apparent motion of the planet across the field very uniform. The star was much more distinct than last night, though there was considerable haze.

a Recorded 12.6*s*. at wire C.

b Recorded S. F.

c Recorded 28.8*s*. at wire E.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Eleven transits . . .	5 12 7.74	— 4 0.006 . . .	— 1.627	= 0 31.71
Mean S. F. . .	Nine transits . . .	5 22 16.91	— 3 59.024 . . .	— 2.382	= 0 46.43

	h. m.	m. s.
Correction for chronometer at	5 12 . . .	— 1 33.95
Correction for chronometer at	5 22 . . .	— 1 33.97

	h. m. s.
Santiago sid. time N. P.	5 10 33.79
Santiago sid. time S. F.	5 20 42.94
Interval	10 9.15

	″
Δ P. F. limbs in A. R. reduced to arc . . .	14.73
Variation of A. R. in 10*m*. 9*s*.	— 1.43
Observed P. F. diameter	13.30

	″
Δ N. S. limbs micr. in rev.	0.755 = 14.72
Variation of declination in 10*m*. 9*s*. . .	— 0.30
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	— 12.22

	h. m.	″
Δ ρ at	5 13	0.03
Δ ρ at	5 23	0.05

JANUARY 28, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	22.4	35.8	48.8	2.2	14.8	4 32 48.80	+0.89			28.058	77.6	59.9
2	Bessel . . . 405	. .	19.8	33.2	46.5	59.0	4 36 33.03	4.94	—3 44.23	—4.05			
3	Mars . . . N.P.	30.4	43.4	56.5	9.8	22.6	4 38 56.54	1.96			Ther. att. 75°4		
4	Bessel . . . 405	15.5	28.5	. .	55.5	. .	4 42 41.88	5.13	3 45.34	3.17	Bar. red. to 32° F.		
5	Mars . . . S.F.	37.3	50.5	3.5	16.8	29.6	4 46 3.54	1.05			27.959		
6	Bessel . . . 405	. .	. .	48.5	1.5	14.5	4 49 48.34	5.38	3 44.80	4.33			
7	Mars . . . N.P.	21.0	34.5	47.8	1.2	13.6	4 52 47.62	2.27					
8	Bessel . . . 405	6.8	20.0	33.2	46.7	59.0	4 56 33.14	5.52	3 45.52	3.25			
9	Mars . . . S.F.	55.5	8.8	22.4	35.5	48.2	4 58 22.08	1.66					
10	Bessel . . . 405	. .	53.2	6.5	20.0	32.5	5 2 6.45	5.69	3 44.37	4.03			
11	Mars . . . N.P.	48.0	1.2	14.5	27.9	40.5	5 6 14.42	1.57					
12	Bessel . . . 405	33.8	46.5	59.8	13.2	26.0	5 9 59.86	4.85	3 45.44	3.28			
13	Mars . . . S.F.	34.7	48.0	1.2	14.5	27.3	5 12 1.14	0.90					
14	Bessel . . . 405	. .	32.8	45.2	58.8	11.2	5 15 45.40	4.92	3 41.26	4.02			
15	Mars . . . N.P.	21.0	34.3	47.5	0.5	13.5	5 17 47.36	1.77					
16	Bessel . . . 405	. .	21.2	. .	47.0	59.5	5 21 33.79	5.00	3 46.43	3.23			
17	Mars . . . S.F.	16.0	29.3	42.4	55.6	8.4	5 23 42.34	1.13					
18	Bessel . . . 405	. .	14.2	27.0	40.2	53.0	5 27 27.00	5.18	3 44.66	4.05			
19	Mars . . . N.P.	56.2	9.5	22.4	35.0	48.8	5 29 22.58	1.98					
20	Bessel . . . 405	. .	54.3	7.3	20.5	33.5	5 33 7.30	5.19	3 44.72	3.21			
21	Mars . . . S.F.	41.8	55.2	8.2	21.5	34.3	5 35 8.20	1.33					
22	Bessel . . . 405	25.5	38.8	52.0	5.3	18.0	5 38 51.92	5.34	3 43.72	4.01			
23	Mars . . . N.P.	26.5	39.8	52.9	6.1	19.2	5 40 52.90	2.32					
24	Bessel . . . 405	11.5	24.5	37.5	51.1	3.6	5 44 37.61	5.52	3 44.74	3.20			
25	Mars . . . S.F.	1.8	15.2	28.4	41.5	54.4	5 46 28.26	1.61					
26	Bessel . . . 405	. .	58.5	11.6	25.1	37.7	5 50 11.63	5.69	3 43.37	4.05			
27	Mars . . . N.P.	16.8	30.2	43.4	56.8	9.5	5 53 43.34	2.62					
28	Bessel . . . 405	1.5	14.8	27.8	41.2	53.8	5 57 27.82	5.90	3 44.48	3.28			
29	Mars . . . S.F.	6.8	20.3	33.3	46.8	59.5	5 59 33.34	1.96					
30	Bessel . . . 405	50.5	3.8	16.8	30.3	42.7	6 3 16.82	5.98	3 43.48	4.02			
31	Mars . . . N.P.	7.2	20.5	33.6	47.0	59.8	6 5 33.62	1.21					
32	Bessel . . . 405	. .	5.0	18.0	31.4	44.3	6 9 18.08	4.40	3 44.46	3.19			
33	Mars . . . S.F.	13.5	27.0	40.3	53.5	6.5	6 11 40.16	0.28					
34	Bessel . . . 405	57.0	10.5	23.5	36.8	49.5	6 15 23.46	4.31	3 43.30	4.03			
35	Mars . . . N.P.	9.6	22.5	35.8	49.1	2.0	6 18 35.80	1.05					
36	Bessel . . . 405	54.4	. .	20.7	34.0	46.8	6 22 20.70	4.33	3 44.90	3.28			
37	Mars . . . S.F.	49.3	2.3	15.5	28.8	41.5	6 25 15.48	1.88					
38	Bessel . . . 405	32.9	46.3	59.5	12.5	24.8	6 28 59.20	6.03	3 43.72	4.15			
39	Mars . . . N.P.	19.8	33.0	46.0	59.5	12.1	6 31 46.08	2.93					
40	Bessel . . . 405	. .	17.3	30.5	43.7	56.5	6 35 30.40	6.26	3 44.32	3.33			
41	Mars . . . S.F.	44.8	57.8	11.0	24.3	37.2	6 38 11.02	2.34					
42	Bessel . . 405	27.8	41.0	54.3	7.5	20.3	6 41 54.18	6.41	3 43.16	4.07			
43	Mars . . . N.P.	53.5	7.5	20.5	34.3	46.8	6 44 20.52	3.35					
44	Bessel . . . 405	38.8	51.8	5.0	18.0	31.0	6 48 4.92	6.85	3 44.40	3.50			
45	Mars . . . S.F.	12.0	25.0	38.3	51.5	4.5	6 51 38.26	1.56					
46 a	Bessel . . . 405	54.6	. .	21.2	34.5	47.2	6 55 21.10	+5.81	—3 42.84	—4.25			

JANUARY 28, 1850—Continued.

Remarks.

Most of the observations have been made with extreme difficulty. The star is so indistinct as to be scarcely observable at all. This, in a manner, may account for the great discrepancies at times; but it is considered proper to give everything precisely as observed.

a Recorded 53.6s. at wire A.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Twelve transits . . .	5 41 44.38	—3 43.826	—4.088 . . .	=1 19.67
Mean N. P. . .	Eleven transits . . .	5 41 49.16	—3 44.977	—3.265 . . .	=1 3.63

	m. s.		h. m. s.
Correction for chronometer at 5 42 (h. m.) . . .	—1 37.55	Santiago sid. time S. F.	5 40 6.83
Correction for chronometer at 5 42 . . .	—1 37.55	Santiago sid. time N. P.	5 40 11.61
		Interval	4.78

	″		″
Δ P. F. limbs in A. R. reduced to arc . .	17.26	Δ N. S. limbs micr. in rev.	0.823=16.04
Variation of A. R. in 5s.	— 0.01	Variation of declination in 5s.	— 0.00
Observed P. F. diameter	17.25	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.84

h. m.	″	h. m.	″
Δ ρ at 5 42	0.08	Δ ρ at 5 42	0.07

JANUARY 29, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	17.8	31.3	44.4	57.6	10.5	4 19 44.32	+1.44			28.088	71.9	59.9
2	Bessel . . . 405	. .	58.7	11.5	25.2	. .	4 23 11.71	6.05	—3 27.39	—4.61			
3	Mars . . . S.F.	15.6	29.2	42.3	55.5	8.5	4 28 42.22	0.76			Ther. att. 70°.8 Bar. red. to 32° F. 27.973		
4	Bessel . . . 405	. .	. .	9.2	22.5	35.0	4 32 9.07	6.16	3 26.85	5.40			
5	Mars . . . N.P.	39.0	52.5	5.5	18.9	31.6	4 35 5.50	1.74					
6	Bessel . . . 405	. .	. .	33.0	. .	58.9	4 38 32.89	6.40	3 27.39	4.66			
7	Mars . . . S.F.	22.2	35.6	48.5	2.0	14.6	4 40 48.58	1.16					
8	Bessel . . . 405	. .	1.5	14.8	28.2	40.5	4 43 14.65	6.66	3 26.07	5.50			
9	Mars . . . N.P.	54.8	8.5	21.6	35.2	47.8	4 46 21.58	2.05					
10	Bessel . . . 405	21.5	34.8	47.8	1.2	13.7	4 49 47.80	6.71	3 26.22	4.66			
11 *a*	Mars . . . S.F.	14.1	27.3	40.5	53.8	6.8	4 54 40.50	1.56					
12	Bessel . . . 405	40.2	53.5	6.5	19.8	32.5	4 58 6.50	7.02	3 26.00	5.46			
13	Mars . . N.P.	36.9	50.9	3.5	16.8	29.5	5 0 3.52	2.54					
14	Bessel . . . 405	3.8	17.8	30.2	43.5	56.3	5 3 30.32	7.19	3 26.80	4.65			
15	Mars . . . S.F.	5.5	18.7	31.8	45.3	58.0	5 7 31.86	2.02					
16	Bessel . . . 405	31.5	44.6	57.7	11.1	23.6	5 10 57.57	7.38	3 25.71	5.36			
17	Mars . . . N.P.	56.6	9.8	22.8	36.2	48.8	5 13 22.84	2.94					
18	Bessel . . . 405	23.2	36.7	49.8	3.2	15.8	5 16 49.74	7.61	3 26.90	4.67			
19	Mars . . . S.F.	32.0	45.5	58.8	12.0	24.8	5 18 58.62	0.79					
20	Bessel . . . 405	58.0	11.2	24.2	37.7	50.3	5 22 24.28	6.21	3 25.66	5.42			
21	Mass . . . N.P.	57.5	10.6	23.7	37.0	49.8	5 24 23.72	1.57					
22	Bessel . . . 405	. .	37.8	50.5	4.3	16.5	5 27 50.68	6.25	3 26.96	4.68			
23	Mars . . . S.F.	28.8	42.0	55.3	8.5	21.3	5 29 55.18	0.78					
24	Bessel . . . 405	54.6	7.7	20.8	34.2	46.8	5 33 20.82	+6.21	—3 25.64	—5.43			

JANUARY 29, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
25	Mars . . . N.P.	21.5	34.8	47.7	1.4	13.8	5 36 47.84	+1.66			28.088	71.9	59.9
26	Bessel . . . 405	. .	1.5	14.5	27.8	40.3	5 40 14.43	6.34	—3 26.59	—4.68			
27	Mars . . . S.F.	11.0	24.2	37.3	50.8	3.4	5 42 37.34	1.00			Ther. att. 70°.8		
28	Bessel . . . 405	36.5	49.8	2.8	16.3	28.8	5 46 2.84	6.46	3 25.50	5.46	Bar. red. to 32° F.		
29	Mars . . . N.P.	25.1	38.2	51.4	4.8	17.6	5 47 51.42	1.80			27.973		
30	Bessel . . . 405	51.6	4.8	18.0	31.4	44.1	5 51 17.98	6.61	3 26.56	4.81			
31	Mars . . . S.F.	1.2	14.5	27.7	41.3	53.7	5 53 27.68	1.27					
32	Bessel . . . 405	26.5	39.5	52.5	6.0	18.8	5 56 52.66	6.83	3 24.98	5.56			
33	Mars . . . N.P.	33.4	46.7	59.8	12.8	25.5	5 58 59.64	2.19					
34	Bessel . . . 405	0.0	13.0	26.1	39.5	52.2	6 2 26.16	6.89	2 26.52	4.70			
35	Mars . . . S.F.	49.5	2.5	15.7	29.1	41.8	6 4 15.72	1.59					
36	Bessel . . . 405	14.6	27.5	40.8	54.5	6.8	6 7 40.84	7.11	3 25.12	5.52			
37	Mars . . . N.P.	59.8	12.8	26.0	39.5	51.9	6 9 26.00	2.15					
38	Bessel . . . 405	26.1	39.2	52.3	5.8	18.5	6 12 52.38	6.90	3 26.38	4.75			
39	Mars . . . S.F.	36.2	49.3	2.5	15.8	28.5	6 15 2.46	1.73					
40	Bessel . . . 405	1.2	14.5	27.5	41.0	53.6	6 18 27.56	7.25	3 25.10	5.52			
41	Mars . . . N.P.	59.3	12.5	25.7	39.5	51.8	6 21 25.76	2.44					
42	Bessel . . . 405	25.5	38.6	51.6	5.2	17.8	6 24 51.74	7.20	3 25.98	4.76			
43	Mars . . . S.F.	13.6	27.1	40.0	53.5	6.3	6 26 40.10	1.78					
44	Bessel . . . 405	38.8	51.8	4.8	18.4	31.0	6 30 4.96	+7.30	—3 24.86	—5.52			

Remarks.

Planet and star without much flickering motion or flaring light, and the latter evidently more distinct than last night after the twilight passed. It was seen very clearly in the unilluminated telescope, and might have been measured during twilight.

a Recorded 30.5*s*.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Eleven transits . . .	5 23 2.92	—3 26.699	—4.694	=1 31.48
Mean S. F. . .	Eleven transits . . .	5 29 20 02	—3 25.590	—5.468	=1 46.57

	m. s.		h. m. s.
Correction for chronometer at 5 23 (h. m.) . . .	—1 41.13	Santiago sid. time N. P.	5 21 21.79
Correction for chronometer at 5 29 . . .	—1 41.14	Santiago sid. time S. F.	5 27 38.88
		Interval	6 17.09

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	16.63	Δ N. S. limbs micr. in rev.	0.774=15.09
Variation of A. R. in 6*m*. 17*s*.	—1.30	Variation of declination in 6*m*. 17*s*. . .	— 0.12
Observed P. F. diameter	15.33	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	12.77

	″		″
Δ ρ at 5 23 (h. m.)	0.10	Δ ρ at 5 29 (h. m.)	0.11

JANUARY 30, 1850.

Cloudy.

JANUARY 31, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	18.5	31.8	45.4	58.3	11.0	4 34 44 92	+1.23			28.127	73.0	61.0
2	Bessel . . . 405	59.8	13.5	26.8	40.5	52.6	4 37 26.64	8.47	—2 41.72	—7.24			
3	Mars . . . S.F.	7.5	20.8	34.0	47.4	0.2	4 39 33.98	0.42			Ther. att. 72°.0 Bar. red. to 32° F. 28.008		
4	Bessel . . . 405	. .	1.6	14.8	28.1	40.8	4 42 14.73	8.33	2 40.75	7.91			
5	Mars . . . N.P.	38.5	51.5	4.5	18.0	30.6	4 44 4.62	1.29					
6	Bessel . . . 405	20.3	33.5	46.5	59.5	12.5	4 46 46.46	8.46	2 41.84	7.17			
7	Mars . . . S.F.	11.5	24.8	38.5	51.5	4.3	4 48 38.12	0.70					
8	Bessel . . . 405	52.7	5.9	19.1	32.4	45.0	4 51 19.02	8.74	2 40.90	8.04			
9	Mars . . . N.P.	47.4	0.5	13.6	27.0	39.5	4 53 13.60	1.71					
10	Bessel . . . 405	. .	41.8	55.5	8.8	22.4	4 55 55.53	8.92	2 41.93	7.21			
11	Mars . . . S.F.	1.2	14.5	27.5	40.8	53.8	4 58 27.56	1.11					
12	Bessel . . . 405	41.8	55.0	8.0	21.5	34.3	5 1 8.12	9.15	2 40.56	8.04			
13	Mars . . . N.P.	13.0	26.2	39.5	52.8	5.6	5 4 39.42	2.07					
14	Bessel . . . 405	. .	8.2	21.2	34.5	46.5	5 7 21.00	9.31	2 41.58	7.24			
15	Mars . . . S.F.	2.6	15.7	28.8	42.2	54.8	5 9 28.82	0.45					
16	Bessel . . 405	43.5	56.5	9.5	22.8	35.3	5 12 9.52	8.42	2 40.70	7.97			
17	Mars . . . N.P.	26.4	39.3	52.5	5.6	18.5	5 13 52.46	1.34					
18	Bessel . . . 405	7.5	20.5	33.5	47.0	59.6	5 16 33.62	8.51	2 41.16	7.17			
19	Mars . . . S.F.	23.8	37.0	50.2	3.5	16.3	5 18 50.16	0.69					
20	Bessel . . . 405	4.5	17.5	30.5	43.8	56.5	5 21 30.56	8.64	2 40.40	7.95			
21	Mars . . . N.P.	53.0	6.2	19.4	32.6	45.3	5 23 19.30	1.49					
22	Bessel . . . 405	34.5	47.5	0.6	13.8	26.5	5 26 0.58	8.76	2 41.28	7.27			
23	Mars . . . S.F.	23.0	36.5	49.8	3.0	16.3	5 27 49.72	0.86					
24	Bessel . . . 405	. .	16.8	29.8	43.3	56.6	5 30 30.03	8.83	2 40.31	7.97			
25	Mars . . . N.P.	31.1	44.1	57.3	10.5	23.2	5 32 57.24	1.78					
26	Bessel . . . 405	12.0	25.2	38.5	51.6	4.5	5 35 38.36	9.01	2 41.12	7.23			
27	Mars . . . S.F.	19.2	32.4	45.5	58.8	11.5	5 37 45.48	1.06					
28	Bessel . . . 405	59.8	12.7	26.0	39.5	52.2	5 40 26.04	9.13	2 40.56	8.07			
29	Mars . . . N.P.	18.8	32.0	45.0	58.4	11.2	5 42 45.08	1.95					
30	Bessel . . . 405	59.8	12.8	25.8	39.2	51.8	5 45 25.88	9.19	2 40.80	7.24			
31	Mars . . . S.F.	28.0	41.0	54.0	7.5	20.3	5 48 54.16	1.30					
32 *a*	Bessel . . . 405	. .	. .	33.7	47.2	0.2	5 51 33.87	9.39	2 39.71	8.09			
33 *b*	Mars . . . N.P.	43.2	56.6	9.5	23.0	35.5	5 54 9.56	2.12					
34	Bessel . . . 405	23.7	36.8	49.8	2.5	16.4	5 56 49.84	9.20	2 40.28	7.08			
35	Mars . . . S.F.	7.8	21.0	34.3	47.6	0.4	6 0 34.22	1.39					
36	Bessel . . . 405	47.5	0.6	13.7	27.3	39.8	6 3 13.78	9.47	2.39.56	8.08			
37	Mars . . . N.P.	51.6	5.2	18.3	31.6	44.4	6 5 18.22	1.29					
38	Bessel . . . 405	32.5	. .	58.7	12.1	25.0	6 7 58.80	8.48	2 40.58	7.19			
39	Mars . . . S.F.	42.0	55.2	8.5	21.8	34.5	6 10 8.40	0.30					
40	Bessel . . . 405	21.5	34.8	48.0	1.5	14.2	6 12 48.00	8.42	2 39.60	8.12			
41	Mars . . . N.P.	23.0	36.0	49.4	2.4	15.4	6 14 49.24	1.08					
42	Bessel . . . 405	3.3	. .	29.5	. .	55.8	6 17 29.62	8.39	2 40.38	7.31			
43	Mars . . . S.F.	41.5	55.0	8.3	21.5	34.5	6 20 8.16	0.63					
44	Bessel . . . 405	21.5	34.4	47.5	1.0	13.6	6 22 47.60	8.69	2 39.44	8.06			
45	Mars . . . N.P.	21.5	34.5	47.7	1.0	13.6	6 26 47.66	1.38					
46	Bessel . . . 405	1.6	14.6	28.0	41.2	53.8	6 29 27.84	+8.67	—2 40.18	—7.29			

JANUARY 31, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Mars . . .	S.F.	26.0	39.1	52.3	5.6	18.5	6 31 52.30	+0.68			28.127	73.0	61.0
48	Bessel . . .	405	. .	18.3	31.2	44.7	57.5	6 34 31.32	8.75	—2 39.02	—8.07			
49	Mars . . .	N.P.	37.2	50.5	3.5	16.8	29.5	6 37 3.50	1.19			Ther. att. 72°.0		
50	Bessel . . .	405	17.5	30.8	43.8	57.1	9.8	6 37 43.80	8.61	2 40.30	7.42	Bar. red. to 32° F. 28.008		
51	Mars . . .	S.F.	11.5	25.0	38.0	51.3	4.2	6 42 38.00	0.71					
52	Bessel . . .	405	50.8	3.7	17.0	30.2	42.8	6 45 16.90	+8.87	—2 38.90	—8 16			

Remarks.

Last night was cloudy, and this afternoon there has been a snow-storm on the cordilleras, N.E. from Santiago; but the whole evening has been extremely favorable for observations, and the measures are regarded as tolerably good—the star bearing illumination pretty well.

a Hurried.

b There was an apparent slip in declination after observing the star on wire B.

Results.

		h. m. s.
Mean N. P. . .	Thirteen transits . .	5 34 26.52
Mean S. F. . .	Thirteen transits . .	5 39 36.08

	m. s.		Rev.		′ ″
	—2 41.011		+7.235		=2 21.01
	—2 40.031		+7.989		=2 35.70

h. m.	m. s.
Correction for chronometer at 5 34 . . .	—1 48.06
Correction for chronometer at 5 40 . . .	—1 48.08

	h. m. s.
Santiago sid. time for N. P.	5 32 38.46
Santiago sid. time for S. F.	5 37 48.00
Interval	5 9.54

	″
Δ P. F. limbs in A. R. reduced to arc . . .	14.70
Variation of A. R. in 5*m*. 9*s*.	— 1.40
Observed P. F. diameter	13.30

	″
Δ N. S. limbs micr. in rev. 0.754	=14.69
Variation of declination in 5*m*. 9*s*. . .	— 0.07
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	12.42

h. m.	″
Δ ρ at 5 34	0.15

h. m.	″
Δ ρ at 5 39	0.17

OPPOSITION OF MARS: 1851-52.

DECEMBER 16, 1851.															
No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . .	S.P.	25.0	37.5	50.0	2.5	16.0	6 40 50.20	—3.76½			28.040	61.3	56.2
2	B. A. C. . .	3181	11.5	24.5	37.0	49.5	2.0	6 43 36.90	7.79	—2 46.70	+4.02½			
3	Mars . . .	S.P.	26.8	39.5	52.0	4.5	17.5	6 45 52.06	4.36			Ther. att. 66°.6		
4	B. A. C. . .	3181	13.5	26.0	38.8	51.0	4.0	6 48 38.66	8.44	2 46.60	4.08	Bar. red. to 32° F.		
5	Mars . . .	S.P.	4.5	17.0	29.5	41.7	54.5	6 55 29.44	5.32			27.936		
6 a	B. A. C. . .	3181	51.0	3.5	16.0	28.5	41.5	6 58 15.10	9.42	2 46.66	4.10			
7	Mars . . .	S.P.	38.5	51.0	3.5	15.8	28.5	7 14 3.46	6.66					
8	B. A. C. . .	3181	25.0	37.5	. .	2.6	15.5	7 16 50.16	11.02	2 46.70	4.36			
9	Mars . . .	S.P.	20.8	33.5	46.0	58.5	11.0	7 18 45.96	7.09½					
10	B. A. C. . .	3181	7.5	20.5	32.8	45.1	58.0	7 21 32.78	11.43	2 46.82	4.33½			
11	Mars . . .	S.P.	19.5	32.0	44.6	57.0	9.5	7 23 44.52	3.00					
12	B. A. C. . .	3181	6.5	19.0	31.5	44.0	56.5	7 26 31.50	7.35	2 46.98	4.35			
13	Mars . . .	S.P.	30.5	43.0	55.5	8.0	20.7	7 28 55.54	3.31½					
14	B. A. C. . .	3181	17.4	30.0	42.3	55.0	7.5	7 31 42.44	7.67	2 46.90	4.35½			
15 b	Mars . . .	S.P.	40.5	53.0	5.5	17.8	30.5	7 34 5.46	3.55					
16	B. A. C. . .	3181	. .	39.5	52.5	4.5	17.5	7 36 52.20	7.91	2 46.74	4.36			
17	Mars . . .	S.P.	32.0	45.5	57.2	9.5	22.5	7 39 57.34	4.92					
18	B. A. C. . .	3181	19.0	31.5	44.0	56.5	9.5	7 42 44.10	9.34	2 46.76	4.42			
19	Mars . . .	S.P.	46.8	59.5	12.0	24.5	37.0	7 45 11.96	5.15					
20	B. A. C. . .	3181	33.5	46.5	59.0	11.3	24.0	7 47 58.86	9.60	2 46.90	4.45			
21	Mars . . .	N.F.	. .	0.2	12.8	25.3	38.0	7 50 12.78	4.50					
22	B. A. C. . .	3181	33.5	46.0	58.5	11.0	24.0	7 52 58.60	9.90	2 45.82	5.40			
23	Mars . . .	N.F.	38.0	50.5	3.0	15.6	28.2	7 55 3.06	4.77½					
24	B. A. C. . .	3181	23.8	36.5	49.0	1.5	14.2	7 57 49.00	10.14	2 45.94	5.36½			
25 c	Mars . . .	N.F.	15.0	27.5	40.0	52.5	5.3	8 0 40.06	5.31					
26	B. A. C. . .	3181	0.5	13.5	26.0	38.5	51.5	8 3 26.00	10.70	2 45.94	5.39			
27	Mars . . .	N.F.	3.0	15.5	28.0	40.5	53.2	8 5 28.04	5.52					
28	B. A. C. . .	3181	48.8	1.5	14.0	26.5	39.0	8 8 13.96	10.94	2 45.92	5.42			
29	Mars . . .	N.F.	43.0	55.5	8.0	20.5	33.5	8 10 8.10	5.68					
30	B. A. C. . .	3181	29.0	42.5	55.0	6.5	19.3	8 12 54.46	11.14	2 46.36	5.46			
31 d	Mars . . .	N.F.	33.8	46.2	59.0	11.5	24.0	8 14 58.90	5.91½					
32	B. A. C. . .	3181	20.0	32.5	45.0	57.8	10.2	8 17 45.10	11.42	2 46.20	5.50½			
33	Mars . . .	N.F.	55.5	8.0	20.5	33.0	45.5	8 20 20.50	5.99					
34	B. A. C. . .	3181	41.3	53.5	6.5	19.0	31.5	8 23 6.36	11.57	2 45.86	5.58			
35	Mars . . .	N.F.	17.2	30.0	42.5	54.8	7.5	8 25 42.40	6.14					
36	B. A. C. . .	3181	3.2	15.5	. .	40.4	53.5	8 28 28.16	—11.74	—2 45.76	+5.60			

DECEMBER 16, 1851—Continued.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
37	Mars . . . N.F.	2.2	15.0	27.4	39.8	52.5	8 32 27.38	—5.69			28.040	61.3	56.2
38	B. A. C. . . 3181	48.3	1.0	15.5	26.0	38.6	8 35 13.88	11.36	—2 46.50	+5.67			
39 *e*	Mars . . . N.F.	0.3	12.8	25.4	37.8	50.5	8 37 25.33	5.86			Ther. att. 66°.6 Bar. red. to 32° F. 27.936		
40	B. A. C. . . 3181	46.2	58.5	11.5	24.0	36.6	8 40 11.36	11.45	2 46.00	5.59			
41	Mars . . . S.P.	5.5	18.3	30.8	43.2	55.8	8 42 30.72	2.89					
42	B. A. C. . . 3181	52.0	5.0	17.7	30.3	42.0	8 45 17.40	7.68	2 46.68	4.79			
43	Mars . . . N.F.	2.0	14.5	27.2	39.5	52.0	8 47 27.04	2.00					
44	B. A. C. . . 3181	48.0	0.5	13.1	25.6	38.2	8 50 13.08	7.62	2 46.04	5.62			
45	Mars . . . S P.	32.0	45.5	57.5	9.5	22 3	8 51 57.36	2.88					
46	B. A. C. . . 3181	19.0	31.6	44.3	56.6	9.5	8 54 44.20	—7.75	—2 46.84	+4.87			

Remarks.

During all the earlier observations, blurred and unsteady images; light cirri at times obscuring the comparing star.

a Scarcely visible.
b Micrometer recorded 4.55 rev.
c Recorded 8*h*. 0*m*. 30*s*. at wire C.
d Image sharp at all the following observations.
e Sharp and steady at all the following observations.

Results.

		h. m. s.
Mean S. P. . .	First ten transits . .	7 16 41.60
Mean N. F. . .	First ten transits . .	8 13 14.66
Mean N. F. . .	Last transit	8 47 27.04
Mean S. P. .	Last two transits . .	8 47 14.04

m. s.	Rev.	′ ″
— 2 46.776	+ 4.283	1 23.47
2 46.030	5.498	1 47.16
2 46.040	5.620	1 49.53
— 2 46.760	+ 4.830	1 34.13

	h. m.	m. s.
Correction for chronometer at	7 17 . . .	— 1 9.30
Correction for chronometer at	8 13 . . .	— 1 9.45

	h. m. s.
Santiago sid. time S. P.	7 15 32.30
Santiago sid. time N. F.	8 12 5.21
Interval	56 32.91

	″
Δ P. F. limbs in A. R. reduced to arc . . .	11.19
Variation of A. R. in 56*m*. 33*s*.	— 1.22
Observed P. F. diameter	9.97

	″
Δ N. S. limbs micr. in rev.	1.215 = 23.68
Variation of declination in 56*m*. 33*s*. .	— 6.78
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	14.70

	h. m.	m. s.
Correction for chronometer at	8 47 . . .	— 1 9.54
Correction for chronometer at	8 47 . . .	— 1 9.54

	h. m. s.
Santiago sid. time N. F.	8 46 17.50
Santiago sid. time S. P.	8 46 4.50
Interval	13.00

	″
Δ P. F. limbs in A. R. reduced to arc . . .	10.80
Variation of A. R. in 13*s*.	— 0.05
Observed P. F. diameter	10.75

	″
Δ N. S. limbs micr. in rev.	0.790 = 15.40
Variation of declination in 13*s*. . . .	— 0.06
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	13.14

h. m.	″
Δ ρ at 7 18	0.08
Δ ρ at 8 15	0.09

h. m.	″
Δ ρ at 8 48	0.08
Δ ρ at 8 48	0.07

DECEMBER 17, 1851.

Cloudy.

DECEMBER 18, 1851.

Cloudy.

DECEMBER 19, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . . 275	. .	. .	36.8	. .	. .	7 2 36.80	−10.47½			28.095	53.5	49.6
2	Mars . . . S.P.	. .	. .	33.5	. .	. .	7 3 33.50	5.10	+56.70	+5.37½			
3	Bessel . . . 275	. .	. .	4.0	. .	. .	7 8 4.00	10.98			Ther. att. 61°.2 Bar. red. to 32° F. 28.010		
4	Mars . . . S.P.	. .	. .	0.2	. .	. .	7 9 0.20	5.42	56.20	5.56			
5	Bessel . . . 275	. .	. .	53.0	. .	. .	7 10 53.00	10.99					
6	Mars . . . S.P.	. .	. .	49.0	. .	. .	7 11 49.00	5.56	56.00	5.43			
7	Bessel . . . 275	. .	2.5	15.3	. .	. .	7 13 15.14	11.29					
8	Mars . . . S.P.	. .	58.5	11.0	. .	. .	7 14 10.99	5.82	55.85	5.47			
9	Bessel . . . 275	11.0	24.0	36.3	. .	. .	7 15 36.32	11.42½					
10	Mars . . . S.P.	7.6	20.0	32.6	. .	. .	7 16 32.62	5.91½	56.30	5.51			
11	Bessel . . . 275	16.5	29.5	42.5	. .	. .	7 18 42.05	11.82½					
12	Mars . . . S.P.	12.7	25.3	37.5	. .	. .	7 19 37.72	6.10	55.67	5.72½			
13	Bessel . . . 275	21.0	33.5	46.2	. .	. .	7 21 46.11	11.96½					
14	Mars . . . S.P.	17.0	29.9	42.5	. .	. .	7 22 42.35	6.41½	56.24	5.55			
15	Bessel . . . 275	. .	11.9	24.5	. .	. .	7 24 24.44	12.18					
16	Mars . . . S.P.	55.0	7.7	20.3	. .	. .	7 25 20.21	6.52½	55.77	5.65½			
17	Bessel . . . 275	35.4	47.5	0.5	. .	. .	7 27 0.35	12.36					
18	Mars . . . S.P.	31.0	43.5	56.2	. .	. .	7 27 56.12	6.70	55.77	5.66			
19	Bessel . . . 275	13.5	26.2	38.8	. .	. .	7 29 38.71	12.56½					
20	Mars . . . S.P.	9.5	22.0	34.8	. .	. .	7 30 34.65	7.05½	55.94	5.51			
21	Bessel . . . 275	20.5	34.5	47.0	. .	. .	7 32 46.55	12.92½					
22	Mars . . . N.F.	18.8	. .	43.7	. .	. .	7 33 43.86	6.50	57.31	6.42½			
23	Bessel . . . 275	11.8	24.5	37.0	. .	. .	7 35 36.98	13.18½					
24	Mars . . . N.F.	8.6	21.2	33.8	. .	. .	7 36 33.75	6.67	56.77	6.51½			
25	Bessel . . . 275	. .	26.8	39.2	. .	. .	7 38 39.24	7.84					
26	Mars . . . N.F.	10.5	23.5	36.0	. .	. .	7 39 35.88	1.31½	56.64	6.52½			
27	Bessel . . . 275	11.0	23.5	36.2	. .	. .	7 41 36.11	8.56½					
28 a	Mars . . . N.F.	7.5	20.3	32.8	. .	. .	7 42 32.75	2.00	56.64	6.56½			
29	Bessel . . . 275	13.2	25.8	38.5	. .	. .	7 44 38.38	8.68½					
30	Mars . . . N.F.	9.7	21.2	34.6	. .	. .	7 45 34.38	2.10	56.00	6.58½			
31	Bessel . . . 275	45.5	58.0	10.5	. .	. .	7 47 10.55	8.91					
32	Mars . . . N.F.	42.5	55.3	7.5	. .	. .	7 48 7.65	2.33	57.10	6.58			
33	Bessel . . . 275	52.0	4.5	17.2	. .	. .	7 50 17.11	9.08					
34	Mars . . . N.F.	48.6	1.2	13.6	. .	. .	7 51 13.68	2.47	56.57	6.61			
35	Bessel . . . 275	19.5	32.0	45.0	. .	. .	7 52 44.71	9.19					
36	Mars . . . N.F.	16.2	28.8	41.3	. .	. .	7 53 41.32	2.59½	56.61	6.59½			
37	Bessel . . . 275	59.8	12.5	25.0	. .	. .	7 55 24.98	9.41½					
38	Mars . . . N.F.	56.5	9.0	21.5	. .	. .	7 56 21.55	2.77	56.57	6.64½			
39	Bessel . . . 275	31.5	44.2	57.0	. .	. .	7 58 56.78	9.59½					
40	Mars . . . N.F.	28.3	41.0	53.5	. .	. .	7 59 53.48	2.91	56.70	6.68½			
41	Bessel . . . 275	20.0	32.8	45.2	. .	. .	8 1 45.21	9.75					
42	Mars . . . S.P.	. .	28.5	41.0	. .	. .	8 2 40.99	3.79	55.78	5.96			
43	Bessel . . . 275	0.0	12.9	25.3	. .	. .	8 4 25.28	9.89					
44	Mars . . . S.P.	56.2	8.5	21.0	. .	. .	8 5 21.12	3.93	55.84	5.96			
45	Bessel . . . 275	13.5	26.0	38.6	. .	. .	8 7 38.58	10.08					
46	Mars . . . S.P.	9.0	21.5	34.3	. .	. .	8 8 34.15	−4.08	+55.57	+6.00			

DECEMBER 19, 1851—Continued.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
47	Bessel . . .	275	. .	14.5	27.0	. .	. .	8 10 26.99	—10.18			28.087	51.5	49.6
48	Mars . . .	S.P.	57.2	9.7	22.5	. .	. .	8 11 22.35	4.14	+55.36	+6.04			
49 *b*	Bessel . . .	275	28.5	41.0	53.6	. .	. .	8 12 53.58	10.32			Ther. att. 60°.5		
50	Mars . . .	S.P.	24.0	36.5	49.0	. .	. .	8 13 49.05	4.23	55.47	6.09	Bar. red. to 32° F.		
51	Bessel . . .	275	26.2	39.0	51.4	. .	. .	8 16 51.41	10.40			28.002		
52	Mars . . .	N.F.	22.5	35.1	47.7	. .	. .	8 17 47.65	3.62½	56.24	6.77½			
53	Bessel . . .	275	21.5	34.1	47.0	. .	. .	8 19 46.75	10.48½					
54	Mars . . .	N.F.	18.6	31.5	44.0	. .	. .	8 20 43.92	3.71	57.17	6.77½			
55	Bessel . . .	275	49.2	2.0	14.5	. .	. .	8 22 14.45	10.58					
56	Mars . . .	N.F.	45.6	58.3	10.8	. .	. .	8 23 10.78	3.76½	56.33	6.81½			
57 *c*	Bessel . . .	275	28.0	40.6	53.2	. .	. .	8 24 53.15	10.70½					
58	Mars . . .	N.F.	24.6	37.2	49.9	. .	. .	8 25 49.78	3.89	56.63	6.81½			
59	Bessel . . .	275	0.0	12.8	25.3	. .	. .	8 29 25.25	10.86					
60	Mars . . .	N.F.	56.2	8.8	21.4	. .	. .	8 30 21.35	3.95½	56.10	6.90½			
61	Bessel . . .	275	42.6	55.0	8.2	. .	. .	8 32 7.81	11.02					
62	Mars . . .	S.P.	38.0	50.4	3.4	. .	. .	8 33 3.15	4.90	55.34	6.12			
63	Bessel . . .	275	. .	48.0	0.5	. .	. .	8 35 0.49	11.14					
64	Mars . . .	N.F.	31.6	44.3	57.0	. .	. .	8 35 56.85	4.16	56.36	6.98			
65	Bessel . . .	275	23.5	36.0	48.5	. .	. .	8 37 48.55	11.33					
66	Mars . . .	S.P.	18.5	31.0	44.0	. .	. .	8 38 43.72	5.10	55.17	6.23			
67 *d*	Bessel . . .	275	0.5	13.5	26.0	. .	. .	8 41 25.88	11.63					
68	Mars . . .	N.F.	57.0	9.5	22.0	. .	. .	8 42 22.05	4.61	56.17	7.02			
69	Bessel . . .	275	35.5	48.3	1.0	. .	. .	8 44 0.81	11.72					
70	Mars . . .	S.P.	31.0	43.5	56.0	. .	. .	8 44 56.05	5.42	55.24	6.30			
71	Bessel . . .	275	51.2	4.0	16.5	. .	. .	8 46 16.45	11.79½					
72	Mars . . .	N.F.	47.5	0.5	13.0	. .	. .	8 47 12.88	—4.80	+56.43	+6.99½			

Remarks.

At the commencement of observations both objects were flaring and very unsteady, the atmosphere being loaded with moisture, and its temperature falling.

a Image tolerably sharp.

b Very sharp, but not perfectly steady.

c Sharp and steady. The white zone about the north pole of Mars distinctly visible and marked by a dark line, the zone appearing nearly one-sixth of the diameter of the planet.

d Recorded 8*h*. 34*m*.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. P. . .	First ten transits . .	7 18 7.71	+ 56.044	+ 5.544	= 1 48.05
Mean N. F. . .	First ten transits . .	7 46 43.83	56.691	6.573	2 8.01
Mean S. P. . .	Next five transits . .	8 8 21.53	55.604	6.010	1 57.13
Mean N. F. . .	Next five transits . .	8 23 34.70	56.494	6.817	2 12.89
Mean S. P. . .	Last three transits . .	8 38 54.31	55.250	6.217	2 1.17
Mean N. F. . .	Last three transits . .	8 41 50.59	+ 56.320	+ 6.998	= 2 16.39

	h. m.	m. s.
Correction for chronometer at	7 18 . . .	—1 21.46
Correction for chronometer at	7 46 . . .	—1 21.64

	h. m. s.
Santiago sid. time S. P.	7 16 46.25
Santiago sid. time N. F.	7 45 22.19
Interval	28 35.94

DECEMBER 19, 1851—Continued.

Results—Continued.

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	9.70	Δ N. S. limbs micr. in rev.	1.029 = 20.05
Variation of A. R. in 28*m*. 36*s*.	+ 3.55	Variation of declination in 28*m*. 36*s*. .	— 4.24
Observed P. F. diameter	13.25	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	13.61

h. m.	m. s.		h. m. s.
Correction for chronometer at 8 8 . . .	—1 21.70	Santiago sid. time S. P.	8 6 59.83
Correction for chronometer at 8 23 . . .	—1 21.74	Santiago sid. time N. F.	8 22 12.96
		Interval	15 13.13

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	13.35	Δ N. S. limbs micr. in rev.	0.807 = 15.72
Variation of A. R. in 15*m*. 13*s*.	+ 1.91	Variation of declination in 15*m*. 13*s*. .	— 2.25
Observed P. F. diameter	15.26	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	11.27

h. m.	s.		h. m. s.
Correction for chronometer at 8 38 . . .	—1 21.78	Santiago sid. time S. P.	8 37 32.53
Correction for chronometer at 8 41 . . .	—1 21.79	Santiago sid. time N. F.	8 40 28.80
		Interval	2 56.27

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	16.05	Δ N. S. limbs micr. in rev.	0.781 = 15.22
Variation of A. R. in 2*m* 56*s*.	+ 0.32	Variation of declination in 2*m*. 56*s*. . .	— 0.44
Observed P. F. diameter	16.37	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	12.58

h. m.	″	h. m.	″
Δ ρ at 7 18	0.10	Δ ρ at 8 23	0.10
Δ ρ at 7 46	0.11	Δ ρ at 8 38	0.09
Δ ρ at 8 8	0.09	Δ ρ at 8 41	0.11

DECEMBER 20, 1851.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Mars . . .	S.F.	31.2	43.5	56.5	9.0	22.0	7 3 56.44	— 9.04			28.073	53.3	51.0
2	Bessel . . .	275	. .	. .	20.5	. .	46.0	7 5 20.66	+ 5.87½	—1 24.22	—14.91½	Ther. att. 60°.4 Bar. red. to 32° F. 27.990		
3	Mars . . .	S.F.	45.5	58.2	10.8	23.2	36.0	7 14 10.74	— 9.61					
4	Bessel . . .	275	. .	23.0	35.0	48.0	0.5	7 15 35.32	+ 4.90	1 24.58	14.51			
5	Mars . . .	S.F.	44.5	57.0	9.7	22.2	. .	7 19 9.63	—10.00					
6	Bessel . . .	275	9.5	22.5	35.0	47.3	. .	7 20 34.86	+ 4.46	1 25.23	14.46			
7	Mars . . .	S.F.	9.0	21.7	34.3	46.8	. .	7 21 34.23	—10.26					
8 *b*	Bessel . . .	275	34.3	46.5	59.0	11.5	. .	7 22 59.11	+ 4.18½	1 24.88	14.44½			
9	Mars . . .	S.F.	33.0	45.8	58.0	10.5	. .	7 25 58.11	—10.47					
10	Bessel . . .	275	. .	10.5	23.1	35.5	. .	7 27 23.02	+ 3.85½	1 24.91	14.32½			
11	Mars . . .	S.F.	32.8	45.5	58.0	10.5	. .	7 29 57.98	—10.71					
12	Bessel . . .	275	58.0	10.2	23.0	35.5	. .	7 31 23.96	+ 3.65	1 24.98	14.36			
13	Mars . . .	S.F.	15.2	27.5	40.5	53.0	. .	7 33 40.33	—10.92½					
14	Bessel . . .	275	40.5	53.1	5.5	18.0	. .	7 35 5.56	+ 3.35	1 25.23	14.27½			
15	Mars . . .	S.F.	6.0	18.5	31.0	43.5	. .	7 38 31.03	—11.16					
16	Bessel . . .	275	31.5	44.0	56.8	9.0	. .	7 39 56.61	+ 3.06	1 25.58	14.22			
17	Mars . . .	S.F.	8.0	20.8	33.3	45.8	. .	7 41 33.26	—11.47					
18 *c*	Bessel . . .	275	33.5	46.2	59.9	11.2	. .	7 42 58.76	+ 2.78	1 25.50	14.25			
19	Mars . . .	S.F.	17.2	29.6	42.0	54.6	. .	7 48 42.13	— 6.63½					
20	Bessel . . .	275	42.5	55.2	8.0	20.5	. .	7 50 7.84	+ 7.48	—1 25.71	—14.11½			

DECEMBER 20, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
21	Mars . . . S.F.	59.0	11.5	24.0	37.0	. .	7 52 24.16	— 6.82			28.073	53.3	51.0
22	Bessel . . . 275	24.5	37.0	49.7	2.2	. .	7 53 49.64	+ 7.26	—1 25.48	—14.08			
23	Mars . . . S.F.	25.0	37.6	50.2	2.5	. .	7 55 50.11	— 7.06½			Ther. att. 60°.4 Bar. red. to 32° F. 27.990		
24	Bessel . . . 275	50.3	3.0	15.5	28.0	. .	7 57 15.49	+ 7.04	1 25.38	14.10½			
25	Mars . . . S.F.	25.2	37.5	50.5	3.0	. .	8 1 50.33	— 7.66					
26	Bessel . . . 275	51.0	3.5	16.0	28.5	. .	8 3 16.04	+ 6.39	1 25.71	14.05			
27	Mars . . . S.F.	46.6	59.3	11.7	24.2	. .	8 5 11.73	— 7.76					
28	Bessel . . . 275	12.5	24.9	37.5	50.0	. .	8 6 37.51	+ 6.23	1 25.78	13.99			
29	Mars . . . S.F.	4.5	17.0	29.5	42.0	. .	8 8 29.53	— 7.90					
30	Bessel . . . 275	30.8	43.3	56.0	8.3	. .	8 9 55.89	+ 6.06	1 26.36	13.96			
31	Mars . . . S.F.	20.5	33.3	45.8	58.0	. .	8 11 45.68	— 8.43					
32	Bessel . . . 275	46.0	58.8	11.2	23.8	. .	8 13 11.24	+ 5.50	1 25.56	13.93			
33	Mars . . . S.F.	8.8	21.5	34.0	46.5	. .	8 15 33.98	— 8.57					
34	Bessel . . . 275	. .	47.0	59.8	12.0	. .	8 16 59.58	+ 5.36	1 25.60	13.93			
35 *d*	Mars . . . S.F.	5.2	17.5	30.4	42.8	. .	8 19 30.26	— 8.69					
36	Bessel . . . 275	30.5	43.0	55.6	8.2	. .	8 20 55.61	+ 5.18½	1 25.35	13.87½	28.080	52.0	51.1
37	Mars . . . S.F.	37.2	49.5	2.2	14.8	. .	8 23 2.21	—, 79			Ther. att. 59°.5 Bar. red. to 32° F. 28.000		
38	Bessel . . . 275	3.0	15.5	28.0	40.5	. .	8 24 28.04	+ 5.03	1 25.83	13.82			
39 *e*	Mars . . . S.F.	48.8	1.5	13.5	26.5	. .	8 27 13.86	— 9.03					
40	Bessel . . . 275	14.8	27.5	40.1	52.5	. .	8 28 40.01	+ 4.82	—1 26.15	—13.85			

Remarks.

A most unfavorable night throughout; at no time was the planet either well defined or steady; and, consequently, the measures are not satisfactory.

a Bad measures of both objects.
b Recorded 7*h*. 23*m*.
c Recorded 7*h*. 43*m*.
d Best measures made to-night.
e Fog and cloud; star just visible; entirely obscured at meridian transit.

Results.

	h. m. s.	m s.	Rev.	′ ″
Mean S. F.	7 48 54.29	— 1 25.401	— 14.173 . . .	= 4 36.23

Correction for chronometer at 7 49 (h. m.) . . . — 1 25.20 (m. s.)   Santiago sid. time S. F. . . . . 7 47 29.09 (h. m. s.)

Δ ρ at 7 49 (h. m.) . . . . 0.23 (″)

DECEMBER 21, 1851.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	21.7	34.5	46.8	59.5	12.2	6 38 46.94	—4.27½			28.079	53.0	47.3
2	Bessel . . . 275	2.5	15.5	28.0	40.5	53.2	6 40 27.94	1.73	—1 41.00	—2.54½			
3 *a*	Mars . . . S.F.	20.8	33.6	46.2	58.8	11.5	6 42 46.18	4.57			Ther. att. 61°.0 Bar. red. to 32° F. 27.993		
4	Bessel . . 275	2.5	15.0	27.3	40.0	52.6	6 44 27.48	—2.14½	—1 41.30	—2.42½			

DECEMBER 21, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
5	Mars . . . S.F.	18.8	31.2	43.5	56.2	9.0	6 46 43.74	—4.96½			28.079	53.0	47.3
6	Bessel . . . 275	0.0	12.5	25.0	37.8	50.5	6 48 25.16	2.50½	—1 41.42	—2.46			
7	Mars . . . S.F.	57.5	10.0	22.5	35.2	48.0	6 50 22.64	5.26			Ther. att. 61°.0		
8	Bessel . . . 275	38.6	51.0	4.3	16.5	29.5	6 52 3.98	2.87½	1 41.34	2.38½	Bar. red. to 32° F. 27.993		
9	Mars . . . S.F.	34.0	46.5	59.2	11.5	24.6	6 53 59.16	5.64					
10	Bessel . . . 275	15.5	28.2	40.5	53.2	5.8	6 55 40.64	3.20	1 41.48	2.44			
11 a	Mars . . . S.F.	24.0	36.8	49.3	1.6	14.5	6 57 49.24	5.90					
12	Bessel . . . 275	5.5	18.0	30.5	43.0	55.6	6 59 30.52	3.52	1 41.28	2.38			
13	Mars . . . S.F.	59.3	11.8	24.2	37.0	49.8	7 1 24.42	6.23					
14	Bessel . . . 275	41.0	. .	6.3	18.8	31.5	7 3 6.27	3.92	1 41.85	2.31			
15	Mars . . . S.F.	53.5	6.0	18.5	31.2	43.7	7 8 18.58	6.95					
16	Bessel . . . 275	34.5	47.8	0.2	12.6	25.3	7 10 0.08	4.65	1 41.50	2.30			
17	Mars . . . S.F.	52.5	5.2	17.5	30.3	43.0	7 12 17.70	7.18					
18	Bessel . . . 275	34.2	46.8	59.6	12.0	24.5	7 13 59.42	4.96	1 41.72	2.22			
19	Mars . . . S.F.	29.5	42.2	54.8	7.3	20.0	7 15 54.76	7.48					
20	Bessel . . . 275	11.5	24.0	36.5	49.0	1.5	7 17 36.50	5.30	1 41.74	2.18			
21	Mars . . . S.F.	19.4	31.6	44.3	56.5	9.5	7 19 44.26	7.76					
22	Bessel . . . 275	1.0	13.5	26.1	38.5	51.0	7 21 26.02	5.56	1 41.76	2.20			
23	Mars . . . S.F.	. .	47.5	0.2	12.8	25.5	7 25 0.20	8.40					
24	Bessel . . . 275	16.8	29.5	42.2	54.5	7.0	7 26 42.00	6.25	1 41.80	2.15			
25	Mars . . . S.F.	33.3	46.0	58.5	11.0	23.5	7 28 58.46	—2.02					
26	Bessel . . . 275	15.5	27.5	40.5	53.0	5.5	7 30 40.40	+0.10	1 41.94	2.12			
27	Mars . . . S.F.	7.7	20.5	33.0	45.5	58.3	7 32 33.00	—2.07					
28	Bessel . . . 275	49.5	2.5	15.0	27.5	40.1	7 34 14.92	0.05	1 41.92	2.02			
29	Mars . . . S.F.	9.0	21.6	34.3	46.6	59.2	7 36 34.14	2.39					
30	Bessel . . . 275	51.0	3.5	16.3	28.6	41.5	7 38 16.18	0.40	1 42.04	1.99			
31	Mars . . . S.F.	53.5	6.2	18.8	31.2	44.0	7 43 18.74	2.69					
32	Bessel . . . 275	35.5	48.1	0.6	13.4	26.0	7 45 0.72	0.76	1 41.98	1.93			
33	Mars . . . S.F.	16.0	28.6	41.2	53.5	6.3	7 46 41.12	2.86½					
34 b	Bessel . . . 275	58.1	10.6	23.2	35.5	48.5	7 48 23.18	0.93½	1 42.06	1.93			
35	Mars . . . S.F.	12.0	24.6	37.0	49.5	2.5	7 50 37.12	3.09					
36	Bessel . . . 275	54.2	7.0	19.6	32.0	44.5	7 52 19.46	1.17	1 42.34	1.92			
37	Mars . . . S.F.	13.3	25.8	38.4	50.8	3.5	7 57 38.36	4.05					
38	Bessel . . . 275	55.5	8.0	20.5	33.0	46.0	7 59 20.60	2.27	1 42.24	1.78			
39	Mars . . . S.F.	7.0	19.5	32.2	44.6	57.5	8 1 32.16	4.19½					
40	Bessel . . . 275	49.5	. .	14.8	26.8	39.8	8 3 14.59	2.40	1 42.43	1.79½			
41	Mars . . . S.F.	44.0	56.8	9.3	21.8	33.4	8 5 9.06	4.35					
42	Bessel . . . 275	26.7	39.1	51.6	4.2	16.9	8 6 51.70	2.60	1 42.64	1.75			
43	Mars . . . S.F.	39.0	52.0	4.5	17.3	30.0	8 9 4.56	4.46					
44	Bessel . . . 275	22.0	34.5	. .	59.8	12.5	8 10 47.20	2.81	1 42.64	1.65			
45	Mars . . . S.F.	1.5	13.5	26.8	39.0	51.6	8 14 26.48	5.40					
46	Bessel . . . 275	44.0	56.5	9.0	21.7	34.3	8 16 9.10	3.79	1 42.62	1.61			
47	Mars . . . S.F.	36.6	49.3	2.8	14.3	27.0	8 18 2.00	5.52					
48	Bessel . . . 275	19.2	32.0	44.5	56.8	9.5	8 19 44.40	3.87	1 42.40	1.65			
49	Mars . . . S.F.	17.5	30.5	43.0	55.5	8.0	8 21 42.90	5.65½					
50	Bessel . . . 275	0.5	13.2	25.8	38.2	50.8	8 23 25.70	—4.02	—1 42.80	—1.63½			

DECEMBER 21, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
51	Mars . . . S.F.	45.8	58.5	11.0	23.5	36.3	8 25 11.02	—5.72½			28.082	48.5	46.5
52	Bessel . . . 275	28.5	. .	53.8	6.2	18.6	8 26 53.64	4.15½	—1 42.62	—1.57			
53	Mars . . . S.F.	45.8	58.5	. .	23.8	36.2	8 29 11.08	5.90			Ther. att. 60°.5		
54	Bessel . . . 275	28.8	. .	54.2	6.5	19.0	8 30 53.99	4.28½	1 42.91	1.61½	Bar. red. to 32° F.		
55	Mars . . . S.F.	11.0	23.5	36.2	48.5	1.3	8 33 36.10	6.93½			27.977		
56	Bessel . . . 275	53.6	6.5	19.0	31.3	44.2	8 35 18.92	5.37	1 42.82	1.56½			
57	Mars . . . S.F.	6.3	18.6	31.3	43.7	56.7	8 37 31.32	6.91					
58	Bessel . . . 275	49.2	1.6	14.2	26.8	39.5	8 39 14.26	5.45	1 42.94	1.46			
59	Mars . . . S.F.	36.8	49.3	1.6	14.3	27.0	8 41 1.80	6.93					
60	Bessel . . . 275	19.5	32.3	44.6	57.5	9.6	8 42 44.70	5.50	1 42.90	1.43			
61	Mars . . . S.F.	25.0	37.6	50.3	2.6	15.3	8 44 50.16	7.00					
62	Bessel . . . 275	8.0	20.7	33.3	45.8	58.3	8 46 33.22	5.58	1 43.06	1.42			
63	Mars . . . S.F.	47.0	59.5	12.1	24.6	37.3	8 48 12.10	7.15½					
64	Bessel . . . 275	30.1	42.6	55.5	7.6	20.3	8 50 55.22	—5.75	—1 43.12	—1.40½			

Remarks.

Good images and tolerably steady all night. The dark line bounding the north polar zone is not as distinct as on the night before last, nor do I perceive the brownish-red portion on the southeast quarter of the planet.

a Measures close. *b* Measures open.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	7 44 20.61	— 1 42.144	— 1.945	0 37.91

Correction for chronometer at 7 44 (h m.) . . . —1 27.68 (m. s.)

Santiago sid. time S. F. . . . . 7 42 52.93 (h. m. s.)

Δ ρ at 7 45 (h. m.) . . . . 0.04 (″)

DECEMBER 22, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	24.5	37.2	49.6	2.3	14.8	6 33 49.68	— 0.91			27.958	60.0	53.5
2	Bessel . . . 275	26.0	. .	51.3	3.6	16.5	6 35 51.22	11.16½	—2 1.54	+10.25½			
3	Mars . . . S.F.	19.5	32.2	44.6	57.2	9.9	6 38 44.68	1.35½			Ther. att. 65°.4		
4	Bessel . . . 275	. .	. .	46.3	58.8	11.5	6 40 46.29	11.75	2 1.61	10.39½	Bar. red. to 32° F.		
5	Mars . . . S.F.	34.5	47.3	59.8	12.4	25.0	6 42 59.80	1.67			27.860		
6	Bessel . . . 275	36.1	48.3	1.5	. .	26.8	6 45 1.31	12.12	2 1.51	10.45			
7	Mars . . . S.F.	52.3	3.8	17.5	30.2	42.7	6 48 17.30	2.18½					
8	Bessel . . . 275	54.2	. .	. .	31.6	44.6	6 50 19.30	—12.75	—2 2.00	+10.56½			

DECEMBER 22, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
9	Mars . . . S.F.	52.8	5.3	18.0	30.5	43.2	6 56 17.96	+ 5.13			27.958	60.0	53.5
10	Bessel . . . 275	54.2	7.5	20.0	32.6	45.1	6 58 19.88	— 5.50	—2 1.92	+10.63			
11	Mars . . . S.F.	14.5	26.8	39.5	52.0	4.6	7 0 39.48	+ 4.76			Ther. att. 65°.4		
12	Bessel . . . 275	17.0	29.6	42.1	54.5	7.0	7 2 42.04	— 5.92	2 2.56	10.68	Bar. red. to 32° F.		
13	Mars . . . S.F.	0.5	13.0	25.6	38.3	51.0	7 5 25.68	+ 4.33½			27.860		
14	Bessel . . . 275	3.2	15.6	28.2	40.8	53.5	7 7 28.26	— 6.32	2 2.58	10.65½			
15	Mars . . . S.F.	42.3	54.8	7.5	20.1	32.8	7 10 7.50	+ 3.99					
16	Bessel . . . 275	44.3	. .	9.5	22.0	34.6	7 12 9.40	— 6.70	2 1.90	10.69			
17	Mars . . . S.F.	30.5	43.0	55.5	8.0	20.8	7 14 55.56	+ 3.45					
18	Bessel . . . 275	32.5	45.3	57.8	10.2	23.0	7 16 57.76	— 7.39	2 2.20	10.84			
19	Mars . . . S.F.	48.0	0.5	13.3	25.6	38.4	7 19 13.16	+ 3.15½					
20	Bessel . . . 275	50.3	3.0	15.6	28.1	40.5	7 21 15.50	— 7.59½	2 2.34	10.75			
21	Mars . . . S.F.	9.0	21.8	34.3	46.8	59.4	7 23 34.26	+ 2.86					
22	Bessel . . . 275	11.7	24.5	37.0	49.5	2.0	7 25 36.94	— 7.96	2 2.68	10.82			
23	Mars . . . S.F.	41.5	54.0	6.5	. .	31.7	7 28 6.56	+ 2.51					
24	Bessel . . . 275	43.8	56.8	9.0	21.5	34.2	7 30 9.06	— 8.31	2 2.50	10.82			
25	Mars . . . S.F.	41.5	54.5	6.8	19.5	32.3	7 33 6.92	+ 5.69					
26	Bessel . . . 275	44.3	57.0	9.5	22.0	34.5	7 35 9.46	— 5.22½	2 2.54	10.91½			
27	Mars . . . S.F.	46.8	59.5	11.6	24.5	37.0	7 37 11.88	+ 5.26					
28	Bessel . . . 275	49.7	2.0	14.9	27.5	40.0	7 39 14.82	— 5.65½	2 2.94	10.91½			
29	Mars . . . S.F.	5.0	17.8	30.3	42.7	55.5	7 41 30.26	+ 5.01					
30	Bessel . . . 275	7.7	20.5	33.0	45.5	58.2	7 43 32.98	— 6.02	2 2.72	11.03			
31	Mars . . . S.F.	39.5	52.3	4.6	17.2	30.0	7 46 4.72	+ 4.65½					
32	Bessel . . . 275	42.5	55.2	7.5	20.2	32.8	7 48 7.64	— 6.37½	2 2.92	11.03			
33	Mars . . . S.F.	52.3	4.6	17.3	29.8	42.4	7 50 17.28	+ 4.44					
34	Bessel . . . 275	54.6	7.5	20.1	32.6	45.0	7 52 19.96	— 6.65	2 2.68	11.09			
35	Mars . . . S.F.	29.2	41.6	54.3	6.6	19.3	8 0 54.20	+ 3.30					
36	Bessel . . . 275	32.0	44.5	57.1	9.9	22.5	8 2 57.20	— 7.88½	2 3.00	11.18½			
37	Mars . . . S.F.	4.5	17.0	29.5	42.2	54.7	8 7 29.58	+ 2.74					
38	Bessel . . . 275	7.5	20.3	33.0	45.1	57.8	8 9 32.74	— 8.48½	2 3.16	11.22½			
39	Mars . . . S.F.	12.8	25.3	38.0	50.5	3.0	8 11 37.92	+ 2.61½					
40	Bessel . . . 275	15.7	28.5	41.0	53.5	6.0	8 13 40.94	— 8.63	2 3.02	11.24½			
41	Mars . . . S.F.	14.3	26.8	39.3	. .	4.6	8 15 39.38	+ 2.55					
42	Bessel . . . 275	17.5	30.2	42.7	55.2	7.6	8 17 42.64	— 8.79	2 3.36	11.34			
43	Mars . . . S.F.	50.8	3.5	16.0	28.6	41.3	8 20 16.04	+ 4.77½					
44	Bessel . . . 275	54.5	7.0	19.7	32.3	44.9	8 22 19.68	— 6.59	2 3.64	11.36½			
45	Mars . . . S.F.	43.2	55.8	8.3	20.8	33.5	8 26 8.32	+ 4.43					
46	Bessel . . . 275	46.5	59.5	12.0	24.5	37.0	8 28 11.90	— 6.96	2 3.58	11.39			
47	Mars . . . S.F.	14.6	27.2	39.6	52.2	4.9	8 30 39.70	+ 4.37					
48	Bessel . . . 275	17.9	30.6	43.3	55.8	8.3	8 32 43.18	— 7.10	2 3.48	11.47			
49 a	Mars . . . S.F.	13.9	26.5	39.0	51.5	4.0	8 34 38.98	+4.26			27.950		
50	Bessel . . . 275	17.5	30.3	42.6	55.5	7.8	8 36 42.74	—7.21	2 3.76	11.47			
51 a	Mars . . . S F	14.8	27.3	40.0	52.5	4.6	8 38 39.84	+4.19			Ther. att. 61°.8		
52	Bessel . . . 275	19.5	31.1	43.7	56.2	8.8	8 40 43.86	—7.32	2 4.02	11.51	Bar. red. to 32° F.		
53	Mars . . . S F.	13.5	26.2	38.5	51.0	3.8	8 42 38.00	+4.25			27.861		
54	Bessel . . . 275	17.0	29.8	42.3	54.6	7.5	8 44 42.24	—7.35	—2 3.64	+11.60			

DECEMBER 22, 1851—Continued.

Remarks.

An extremely fine night, definition superb, and motion steady. The line bounding the zone is evidently darkest near the western limb, and the zone itself apparently smaller than when first seen. There is no star in the place given in the Ephemeris, and an error of a minute in the declination was probably made in Bessel, or in the Washington observations.

a Wavy motion in these two observations.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	7 39 13.53	—2 2.730	+10.975 . . .	=3 33.90

	m. s.		h. m. s.
Correction for chronometer at 7 39 (h. m.) . . .	—1 29.98	Santiago sid. time S. F.	7 37 43.55

	″
Δ ρ at 7 40 (h. m.)	0.18

DECEMBER 23, 1851.

Cloudy.

DECEMBER 24, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	14.0	26.8	39.2	51.6	4.3	7 25 39.18	—2.97			28.070	57.7	53.3
2	Washington . . .	. .	. .	25.5	. .	. .	7 26 25.50	1.27	—46.32	—1.70			
3	Mars . . . S.F.	6.6	19.2	31.3	. .	. .	7 28 31.61	3.15			Ther. att. 64°.0 Bar. red. to 32° F. 27.975		
4	Washington . . .	. .	5.5	18.3	. .	. .	7 29 18.15	1.48	46.54	1.67			
5	Mars . . . S.F.	24.6	37.3	49.8	. .	. .	7 32 49.81	3.37					
6	Washington . . .	11.0	24.3	36.2	. .	. .	7 33 36.41	1.75	46.60	1.62			
7	Mars . . . S.F.	37.0	49.5	2.3	. .	. .	7 36 2.21	3.62					
8	Washington . . .	. .	36.0	48.5	. .	. .	7 36 48.50	1.99	46.29	1.63			
9	Mars . . . S.F.	6.3	18.8	31.3	. .	. .	7 38 31.38	3.64					
10	Washington . . .	52.5	5.3	17.6	. .	. .	7 39 17.71	2.09	46.33	1.55			
11	Mars . . . S.F.	26.8	39.5	52.0	. .	. .	7 40 52.01	3.84½					
12	Washington . . .	13.5	26.3	39.0	. .	. .	7 41 38.85	2.26½	46.84	1.58			
13	Mars . . . S.F.	15.8	28.5	41.0	. .	. .	7 42 41.01	3.96					
14	Washington . . .	2.5	15.3	28.0	. .	. .	7 43 27.85	2.46½	46.84	1.49½			
15	Mars . . . S.F.	58.5	11.0	23.5	. .	. .	7 45 23.58	4.09					
16	Washington . . .	. .	57.6	10.0	. .	. .	7 46 10.05	2.65	46.47	1.44			
17	Mars . . . S.F.	50.8	3.5	15.6	. .	. .	7 49 15.88	4.27					
18	Washington . . .	37.5	50.2	2.5	. .	. .	7 50 2.68	2.80	46 80	1.47			
19	Mars . . . S.F.	11.5	24.0	37.0	. .	. .	7 52 36.75	4.45					
20	Washington . . .	58.3	11.2	23.6	. .	. .	7 53 23.62	3.04	46.87	1.41			
21	Mars . . . S.F.	44.0	56.6	9.2	. .	. .	7 55 9.18	4.65					
22	Washington . . .	30.5	43.5	56.0	. .	. .	7 55 55.91	3.22	46.73	1.43			
23	Mars . . . S.F.	58.4	11.0	23.5	. .	. .	7 57 23.55	4.75					
24	Washington . . .	. .	58.0	10.6	. .	. .	7 58 10.55	3.34	47.00	1.41			
25	Mars . . . S.F.	34.2	46.8	59.2	. .	. .	7 59 59.31	4.90½					
26	Washington . . .	22.0	33.6	. .	. .	.	8 0 46.69	3.56	47.38	1.34½			
27	Mars . . S.F.	20.2	32.8	45.4	. .	. .	8 2 45.38	5.27					
28	Washington . . .	7.2	20.0	32.6	. .	. .	8 3 32.51	—3.98	—47.13	—1.29			

DECEMBER 24, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
29	Mars . . . S.F.	9.3	22.0	34.5	. .	. .	8 5 34.51	—5.39			28.070	57.7	53.3
30	Washington . . .	. .	9.2	21.8	. .	. .	8 6 21.75	4.08	—47.24	—1.31			
31	Mars . . . S.F.	15.3	28.0	40.7	. .	. .	8 8 40.58	5.44			Ther. att. 64°.0		
32	Washington . . .	. .	15.0	27.8	. .	. .	8 9 27.65	4.21½	47.07	1.22½	Bar. red. to 32° F.		
33	Mars . . . S.F.	8.0	20.5	33.2	. .	. .	8 11 33.15	5.60			27.975		
34	Washington . . .	55.5	7.5	20.5	. .	. .	8 12 20.42	4.34	47.27	1.26			
35	Mars . . . S.F.	37.0	49.8	. .	. .	. .	8 14 2.29	5.65½					
36	Washington . . .	. .	37.0	. .	. .	. .	8 14 49.54	4.45	47.25	1.20½			
37	Mars . . . S F.	35.5	. .	0.5	. .	. .	8 17 0.64	5.70½					
38	Washington . . .	. .	35.5	48.0	. .	. .	8 17 48.00	4.53	47.36	1.17½			
39	Mars . . . S.F.	4.6	16.5	29.0	. .	. .	8 19 29.28	5.76					
40	Washington . . .	51.6	4.2	16.8	. .	. .	8 20 16.78	4.62	47.50	1.14			
41	Mars . . . S.F.	44.0	56.7	9.2	. .	. .	8 22 9.21	6.22					
42	Washington . . .	. .	44.3	56.5	. .	. .	8 22 56.65	5.11	47.44	1.11			
43	Mars . . . S.F.	30.0	42.5	55.0	. .	. .	8 24 55.08	6.35					
44	Washington . . .	. .	29.8	42.5	. .	. .	8 25 42.40	5.24½	47.32	1.10½			
45	Mars . . . S.F.	9.5	22.3	34.6	. .	. .	8 26 34.71	6.47½					
46	Washington . . .	. .	9.9	22.3	. .	. .	8 27 22.35	5.41½	47.64	1.06			
47	Mars . . . S.F.	3.2	15.8	28.3	. .	. .	8 30 28.35	6.52					
48	Washington . . .	51.0	3.0	16.0	. .	. .	8 31 15.92	5.47½	47.47	1.04½			
49	Mars . . . S.F.	33.8	46.3	58.5	. .	. .	8 32 58.78	6.65					
50	Washington . . .	21.5	34.0	46.8	. .	. .	8 33 46.68	5.57½	47.90	1.07½			
51	Mars . . . S.F.	. .	59.5	12.0	. .	. .	8 34 12.00	6.72					
52	Washington . . .	. .	47.3	59.3	. .	. .	8 35 59.55	5.66	47.55	1.06			
53	Mars . . . S.F.	. .	11.3	23.5	. .	. .	8 38 23.65	6.73					
54	Washington . . .	46.5	59.0	11.6	. .	. .	8 39 11.61	5.70	47.96	1.03			
55	Mars . . . S.F.	54.8	7.5	20.0	. .	. .	8 41 20.01	6.88					
56	Washington . . .	42.6	55.5	7.6	. .	. .	8 42 7.81	5.95	47.80	0.93			
57	Mars . . . S.F.	5.8	18.8	30.5	. .	. .	8 43 30.95	6.98½					
58	Washington . . .	53.6	6.3	18.8	. .	. .	8 44 18.82	6.08	47.87	0.90½			
59	Mars . . . S.F.	29.0	41.5	54.3	. .	. .	8 45 54.18	7.01					
60	Washington . . .	17.3	30.0	42.5	. .	. .	8 46 42.51	6.12	48.33	0.89			
61	Mars . . . S.F.	34.7	47.5	0.2	. .	. .	8 48 0.05	7.05					
62	Washington . . .	. .	35.5	48.2	. .	. .	8 48 48.10	6.15	48.05	0.90			
63	Mars . . . S.F.	52.3	4.5	17.5	. .	. .	8 50 17.35	7.01½			27.970	54.0	52.5
64	Washington . . .	40.5	53.0	5.5	. .	. .	8 51 5.58	—6.21	—48.23	—0.80½			

Remarks.

Definition of planet sharp; but its motion wavy throughout. The comparing star so very dim that it would bear only the least possible light, which rendered the contacts doubtful, and only second rate.

Results.

Mean S. F.	h. m. s. 8 9 27.67	s. — 47.234	Rev. — 1.258	′ ″ = 0 24.52
Correction for chronometer at h. m. 8 9	m. s. — 1 36.17	Santiago sid. time S. F.		h. m. s. 8 7 51.50
Δ ρ at h. m. 8 9		″ 0.02		

DECEMBER 25, 1851.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	28.0	40.5	53.2	5.8	. .	7 24 53.17	+ 3.80			28.019	57.5	
2	Washington . . .	45.0	58.0	10.5	. .	. .	7 26 10.41	— 9.35	—1 17.24	+13.15			
3	Mars . . . S F.	49.0	1.6	14.5	27.0	39.8	7 41 14.38	+ 2.85			Ther. att. 65°.6		
4	Washington . . .	6.5	. .	31.8	. .	. .	7 42 31.75	—10.65	1 17.37	13.50	Bar. red. to 32° F. 27.922		
5	Mars . . . S.F.	. .	. .	33.0	. .	. .	7 50 32.96	+ 2.34					
6	Washington . . .	. .	. .	51.5	. .	. .	7 51 51.46	—11.27½	1 18.50	13.61½			
7	Mars . . . S.F.	. .	. .	20.3	. .	. .	7 53 20.26	+ 2.28					
8	Washington . . .	. .	. .	38.3	. .	. .	7 54 38.26	—11.41	1 18.00	13.69			
9	Mars . . . S.F.	. .	. .	15.5	. .	. .	7 56 15.46	+ 2.06½					
10	Washington . . .	. .	. .	33.2	. .	. .	7 57 33.16	—11.62	1 17.70	13.68½			
11	Mars . . . S.F.	. .	. .	30.5	. .	. .	7 59 30.46	+ 6.75					
12	Washington . . .	. .	. .	48.5	. .	. .	8 0 48.46	— 6.90½	1 18.00	13.65½			
13	Mars . . . S.F.	. .	. .	24.6	. .	. .	8 2 24.56	+ 6.48½					
14	Washington . . .	. .	. .	43.0	. .	. .	8 3 42.96	— 7.24	1 18.40	13.72½			
15	Mars . . . S.F.	. .	. .	11.5	. .	. .	8 5 11.46	+ 6.35					
16	Washington . . .	. .	. .	29.5	. .	. .	8 6 29.46	— 7.37	1 18.00	13.72			
17	Mars . . . S.F.	. .	. .	48.3	. .	. .	8 7 48.26	+ 6.27½					
18	Washington . . .	. .	. .	6.5	. .	. .	8 8 6.46	— 7.62	1 18.20	13.89½			
19	Mars . . S.F.	. .	. .	36.5	. .	. .	8 11 36.46	+ 6.22					
20	Washington . . .	. .	. .	54.6	. .	. .	8 12 54.56	— 7.57½	1 18.10	13.79½			
21	Mars . . . S.F.	. .	. .	15.5	. .	. .	8 14 15.46	+ 6.16					
22	Washington . . .	. .	. .	34.0	. .	. .	8 15 33.96	— 7.69	1 18.50	13.85			
23	Mars . . . S.F.	. .	. .	14.5	. .	. .	8 17 14.46	+ 6.07½					
24	Washington . . .	. .	. .	33.0	. .	. .	8 18 32.96	— 7.83	1 18.50	13.90½			
25	Mars . . . S.F.	. .	. .	6.5	. .	. .	8 20 6.46	+ 5.99					
26	Washington . . .	. .	. .	25.0	. .	. .	8 21 24.96	— 7.88	1 18.50	13.87			
27	Mars . . . S.F.	. .	. .	53.2	. .	. .	8 22 53.16	+ 5.81					
28	Washington . . .	. .	. .	11.5	. .	. .	8 24 11.46	— 8.10½	1 18.30	13.91½			
29	Mars . . . S.F.	. .	. .	42.0	. .	. .	8 26 41.96	+ 5.71					
30	Washington . . .	. .	. .	0.8	. .	. .	8 28 0.76	— 8.29	1 18.80	14.00			
31	Mars . . . S.F.	. .	. .	26.8	. .	. .	8 29 26.76	+ 5.67					
32	Washington . . .	. .	. .	45.5	. .	. .	8 30 45.46	— 8.33½	1 18.70	14.00½			
33	Mars . . . S.F.	. .	. .	2.5	. .	. .	8 32 2.46	+ 5.58					
34 a	Washington . . .	. .	. .	21.0	. .	. .	8 33 20.96	— 8.42	1 18.50	14.00			
35	Mars . . . S.F.	. .	. .	30.5	. .	. .	8 35 30.46	+ 5.57					
36	Washington . . .	. .	. .	50.0	. .	. .	8 36 49.96	— 8.48	1 19.50	14.05			
37	Mars . . . S.F.	. .	. .	33.0	. .	. .	8 39 32.96	+5.49					
38	Washington . . .	. .	. .	52.0	. .	. .	8 40 51.96	−8.59	1 19.00	14.08			
39	Mars . . . S.F.	. .	. .	46.0	. .	. .	8 41 45.96	+5.35½					
40	Washington . . .	. .	. .	5.0	. .	. .	8 43 4.96	—8.69	—1 19.00	+14.04½			

Remarks.

Definition good, but motion wavy as last night. There being no star in the place given in the Ephemeris, and the nearest being that observed last night, comparisons were made with it. They are not considered entirely satisfactory, for the same reasons. On recomputation next day an error was ascertained in the calculated declination amounting to 20′.

a Recorded 31*s*. at wire C.

DECEMBER 25, 1851—Continued.

Results.

Mean S. F.	h. m. s. 8 11 36.88	m. s. —1 18.390 . . . Rev. +13.807	′ ″ 4 29.10
Correction for chronometer at 8 12 (h. m.) . . .	m. s. —1 39.43	Santiago sid. time S. F.	h. m. s. 8 9 57.45
Δ ρ at 8 11 (h. m.)	″ 0.22		

DECEMBER 26, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . S.F.	. .	34.6	47.2	59.8	. .	6 50 47.18	—7.33½			27.974	66.2	55.8
2	Rumker . . 2800	. .	53.6	6.4	19.0	. .	6 52 6.32	+1.65	—1 19.14	—8.98½			
3	Mars . . . S.F.	. .	27.9	40.5	53.0	. .	6 54 40.45	—7.63			Ther. att. 68°.7 Bar. red. to 32° F. 27.865		
4	Rumker . . 2800	. .	46.6	59.3	12.0	. .	6 55 59.28	+1.38½	1 18.83	9.01½			
5	Mars . . . S.F.	. .	47.9	0.3	12.8	. .	6 58 0.32	—7.89					
6	Rumker . . 2800	. .	6.8	19.5	32.0	. .	6 59 19.42	+1.01	1 19.10	8.90			
7	Mars . . . S.F.	. .	47.3	0.0	12.5	. .	7 3 59.92	—2.80					
8	Rumker . . 2800	. .	6.8	19.5	32.0	. .	7 4 19.42	+6.07	1 19.50	8.87			
9	Mars . . . S.F.	. .	46.5	59.0	11.6	. .	7 5 59.02	—3.04					
10	Rumker . . 2800	. .	5.8	18.5	31.0	. .	7 7 18.42	+5.84	1 19.40	8.88			
11	Mars . . . S.F.	. .	2.3	15.0	27.5	. .	7 9 14.92	—3.25					
12	Rumker . . 2800	. .	21.9	34.3	46.7	. .	7 10 34.28	+5.60½	1 19.36	8.85½			
13	Mars . . . S.F.	. .	16.2	28.8	41.3	. .	7 12 28.75	—3.46					
14	Rumker . . 2800	. .	35.5	48.2	0.6	. .	7 13 48.08	+5.31	1 19.33	8.77			
15	Mars . . . S.F.	. .	4.0	16.7	29.2	. .	7 16 16.62	—3.73					
16	Rumker . . 2800	. .	23.6	36.0	48.5	. .	7 17 36.02	+5.03	1 19.40	8.76			
17	Mars . . . S.F.	. .	57.2	9.7	22.3	. .	7 19 9.72	—3.93½					
18	Rumker . . 2800	. .	17.0	29.5	42.0	. .	7 20 29.48	+4.77	1 19.76	8.70½			
19	Mars . . . S.F.	. .	57.8	10.3	22.9	. .	7 22 10.32	—3.89					
20	Rumker . . 2800	. .	17.3	29.9	42.5	. .	7 23 29.88	+4.75	1 19.56	8.64			
21	Mars . . . S.F.	. .	58.2	10.8	23.3	. .	7 25 10.75	—4.21					
22	Rumker . . 2800	. .	18.0	30.5	43.0	. .	7 26 30.48	+4.41	1 19.73	8.62			
23	Mars . . . S.F.	. .	59.2	11.6	24.2	. .	7 28 11.65	—4.19					
24 *a*	Rumker . . 2800	. .	18.6	31.3	43.8	. .	7 29 31.22	+4.42½	1 19.57	8.61½			
25	Mars . . . S.F.	. .	11.3	23.6	36.3	. .	7 33 23.72	—4.70					
26	Rumker . . 2800	. .	31.2	43.6	56.0	. .	7 34 43.58	+3.89	1 19.86	8.59			
27	Mars . . . S.F.	. .	58.8	11.5	24.0	. .	7 36 11.42	—4.87½					
28	Rumker . . 2800	. .	18.8	31.4	44.0	. .	7 37 31.38	+3.63	1 19.96	8.50½			
29	Mars . . . S.F.	. .	1.2	13.8	26.2	. .	7 39 13.72	—5.01½					
30	Rumker . . 2800	. .	21.0	33.6	46.3	. .	7 40 33.62	+3.45	1 19.90	8.46½			
31	Mars . . . S.F.	. .	6.8	19.4	31.8	. .	7 42 19.32	—5.23½					
32	Rumker . . 2800	. .	27.0	. .	52.0	. .	7 43 39.50	+3.20½	1 20.18	8.44			
33 *b*	Mars . . . S.F.	. .	16.0	28.5	41.5	. .	7 45 28.65	—5.38					
34	Rumker . . 2800	. .	36.4	48.5	1.5	. .	7 46 48.78	+3.01½	1 20.13	8.39½			
35	Mars . . . S.F.	. .	32.4	45.0	57.5	. .	7 49 44.95	—5.49					
36	Rumker . . 2800	. .	52.6	5.3	17.8	. .	7 50 5.22	+2.83	—1 20.27	—8.32			

DECEMBER 26, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
37	Mars . . . S.F.	. .	42.9	55.5	8.0	. .	7 51 55.45	—5.63			27.968	60.0	55.3
38	Rumker . . 2800	. .	3.4	15.6	28.4	. .	7 53 15.78	+2.67	—1 20.33	—8.30			
39	Mars . . . S F.	. .	30.2	42.8	55.3	. .	7 55 42.75	—5.76			Ther. att. 66°.0		
40	Rumker . . 2800	. .	50.7	3.2	15.6	. .	7 57 3.15	+2.52	1 20.40	8.28	Bar. red. to 32° F. 27.867		
41	Mars . . . S.F.	. .	20.7	33.3	45.8	. .	7 58 33.25	—5.86					
42	Rumker . . 2800	. .	41.6	54.2	6.6	. .	7 59 54.12	+2.36	1 20.87	8.22			
43	Mars . . . S.F.	. .	18.9	31.5	44.1	. .	8 1 31.48	—5.96					
44	Rumker . . 2800	. .	39.5	52.1	4.6	. .	8 2 52.05	+2.24	1 20.57	8.20			
45	Mars . . . S.F.	. .	19.5	32.3	. .	. .	8 4 32.16	—6.02					
46	Rumker . . 2800	. .	40.5	53.0	5.5	. .	8 5 52.98	+2.11	1 20.82	8.13			
47	Mars . . . S.F.	. .	4.5	17.5	30.0	. .	8 7 17.32	—6.15					
48	Rumker . . 2800	. .	26.0	38.5	51.0	. .	8 8 38.48	+1.96	1 21.16	8.11			
49 c	Mars . . . S.F.	. .	. .	54.2	6.5	. .	8 24 54.05	—5.02					
50	Rumker . . 2800	. .	2.8	15.5	27.8	. .	8 26 15.35	+2.98½	1 21.30	8.00½			
51	Mars . . . S.F.	. .	38.5	51.2	3.6	. .	8 27 51.08	—5.08					
52	Rumker . . 2800	. .	59.7	12.5	24.8	. .	8 29 12.32	+2.83½	1 21.24	7.91½			
53	Mars . . . S.F.	. .	32.8	45.3	57.6	. .	8 30 45.22	—5.11					
54	Rumker . . 2800	. .	54.0	6.5	19.1	. .	8 32 6.52	+2.82½	1 21.30	7.93½			
55	Mars . . . S F.	. .	15.5	28.0	40.6	. .	8 33 28.02	—5.15½					
56	Rumker . . 2800	. .	36.8	49.4	2.0	. .	8 34 49.38	+2.70	1 21.36	7.85½			
57	Mars . . . S.F.	. .	55.5	8.0	20.5	. .	8 36 7.98	—5.16					
58	Rumker . . 2800	. .	17.0	29.6	42.0	. .	8 37 29.52	+2.62½	1 21.54	7.78½			
59	Mars . . . S.F.	. .	32.8	45.6	58.2	. .	8 38 45.52	—5.19					
60	Rumker . . 2800	. .	54.6	7.3	19.9	. .	8 40 7.25	+2.65½	1 21.73	7.84½			
61	Mars . . . S.F.	. .	10.5	23.0	35.5	. .	8 41 22.98	—5.28					
62	Rumker . . 2800	. .	32.2	44.8	57.2	. .	8 42 44.72	+2.50	1.21.74	7.78			
63	Mars . . . S.F.	. .	53.0	5.6	18.0	. .	8 44 5.52	—5.24					
64	Rumker . . 2800	. .	14.5	27.0	39.7	. .	8 45 27.05	+2.51½	—1 21.53	—7.75½			

Remarks.

Fine night; definition good, and measures satisfactory.

a Recorded 44.8*s*. at wire D.

b Measure open.

c Trimming lamps.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. .	Twenty-four transits . .	7 30 30.16	—1 19.880	—8.565	=2 46.93
Mean S. F. .	Last eight transits . . .	8 34 40.05	—1 21.467	—7.859	=2 33.17

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 30 . .	—1 42.98	Santiago sid. time S. F.	7 28 47.18
Correction for chronometer at	8 34 . .	—1 43.14	Santiago sid. time S. F.	8 32 56.91

h. m.	″	h. m.	″
Δ ρ at 7 29	0.15	Δ ρ at 8 33	0.12

DECEMBER 27, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	42.5	54.5	7.0	. .	6 47 54.65	+4.48			27.983	57.8	51.4
2	Rumker . . 2800	. .	38.0	50.5	3.0	. .	6 49 50.48	—2.67	—1 55.83	+7.15			
3	Mars . . . S.F.	. .	19.0	31.5	. .	. .	6 56 31.51	+3.93½			Ther. att. 64°.7 Bar. red. to 32° F. 27.886		
4	Rumker . . 2800	.	15.0	27.5	40.2	. . .	6 58 27.55	—3.25	1 56.04	7.18½			
5	Mars . . . S.F.	. .	32.5	44.7	57.5	. .	7 0 41.83	+3.70½					
6	Rumker . . 2800	.	28.5	41.7	53.5	. .	7 2 41.22	—3.61	1 56.34	7.31½			
7	Mars . . . S.F.	. .	17.0	29.7	42.2	. .	7 6 29.62	+3.02					
8	Rumker . . 2800	. .	13.5	26.0	38.5	. .	7 8 25.98	—4.38	1 56.36	7.40			
9	Mars . . . S.F.	. .	27.5	40.0	52.5	. .	7 10 39.98	+2.77					
10	Rumker . . 2800	. .	24.0	37.0	49.2	. .	7 12 36.72	—4.74½	1 56.74	7.51½			
11	Mars . . . S.F.	. .	17.0	29.6	42.3	. .	7 15 29.62	+2.43					
12	Rumker . . 2800	. .	13.8	26.0	38.5	. .	7 17 26.08	—5.02	1 56.46	7.45			
13	Mars . . . S.F.	. .	16.7	29.2	41.7	. .	7 19 29.18	+2.21½					
14	Rumker . . 2800	. .	13.5	26.0	38.5	. .	7 21 25.98	—5.29	1 56.80	7.50½			
15	Mars . . . S.F.	. .	9.8	22.6	35.3	. .	7 23 22.55	+1.98					
16	Rumker . . 2800	. .	7.0	19.5	32.0	. .	7 25 19.48	—5.65	1 56.93	7.63			
17	Mars . . . S.F.	. .	38.6	50.6	3.3	. .	7 26 50.82	+1.79½					
18	Rumker . . 2800	. .	35.3	47.6	. .	. .	7 28 47.71	—5.90½	1 56.89	7.70			
19	Mars . . . S.F.	. .	5.0	17.7	30.3	. .	7 30 17.65	+1.58					
20	Rumker . . 2800	. .	2.4	15.0	27.5	. .	7 32 14.95	—6.15½	1 57.30	7.73½			
21	Mars . . . S.F.	. .	44.6	57.3	9.8	. .	7 33 57.22	+1.39					
22	Rumker . . 2800	. .	41.5	54.5	7.0	. .	7 35 54.32	—6.33½	1 57.10	7.72½			
23	Mars . . . S.F.	. .	11.7	24.3	36.8	. .	7 37 24.25	+1.22					
24	Rumker . . 2800	. .	9.2	21.6	34.0	. .	7 39 21.58	—6.58	1 57.33	7.80			
25	Mars . . . S.F.	. .	54.0	6.6	19.2	. .	7 41 6.58	+3.70					
26	Rumker . . 2800	. .	51.5	4.0	16.6	. .	7 43 4.02	—4.08	1 57.44	7.78			
27	Mars . . . S.F.	. .	33.3	45.8	58.3	. .	7 44 45.78	+3.62½					
28	Rumker . . 2800	. .	30.6	43.4	56.0	. .	7 46 43.32	—4.27	1 57.54	7.89½			
29	Mars . . . S.F.	. .	9.5	22.0	34.7	. .	7 51 22.05	+3.35					
30	Rumker . . 2800	. .	7.5	20.0	32.6	. .	7 53 20.02	—4.61	1 57,97	7,96			
31	Mars . . . S.F.	. .	21.0	33.5	46.0	. .	8 1 33.48	+2.70½					
32	Rumker . . 2800	. .	19.0	31.5	44.0	. .	8 3 31.48	—5.34	1 58.00	8.04½			
33	Mars . . . S.F.	. .	49.8	2.4	15.0	. .	8 5 2.38	+2,56½					
34	Rumker . . 2800	. .	48.1	0.8	13.3	. .	8 7 0,72	—5.51	1 58.34	8.07½			
35	Mars . . . S.F.	. .	17.5	29.5	42.0	. .	8 8 29,65	+2.42½					
36	Rumker . . 2800	. .	15.6	28.2	40.7	. .	8 10 28,15	—5.63	1 58.50	8.05½			
37	Mars . . . S.F.	. .	49.5	2.2	14.7	. .	8 12 2.12	+2.32½					
38	Rumker . . 2800	. .	48.0	0.5	13.1	. .	8 14 0.52	—5.80	1 58.40	8,12½			
39	Mars . . . S.F.	. .	20.5	33.0	45.5	. .	8 15 32.98	+2.27½					
40	Rumker . . 2800	. .	18.8	31.3	43.9	. .	8 17 31.32	—5.92	1 58.34	8,19½			
41	Mars . . . S.F.	. .	52.8	5,5	18.0	. .	8 20 5.42	+2.16½					
42	Rumker . . 2800	. .	51.5	4.0	16.6	. .	8 22 4.02	—6.10	1 58,60	8,26½			
43	Mars . . . S.F.	. .	54,0	6,6	19.1	. .	8 24 6.55	+2,03					
44	Rumker . . 2800	. .	52.5	5.1	17.5	. .	8 26 5.02	—6,30	1 58.47	8,33			
45	Mars . . . S.F.	. .	20,8	33.5	46.0	. .	8 27 33.42	+1.95					
46	Rumker . . 2800	. .	19.3	32.4	44.8	. .	8 29 32,15	—6.45½	—1 58.73	+8.40½			

DECEMBER 27, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Mars . . . S F.	. .	16.0	28.6	41.3	. .	8 31 28.62	+1.86½			28.011	56.0	52.9
48 *a*	Rumker . . 2800	. .	15.0	27.6	40.0	. .	8 33 27.52	−6.60	−1 58.90	+8.46½			
49	Mars . . . S.F.	. .	1.5	14.0	26.6	. .	8 35 14.02	+1.83			Ther. att. 64°.0		
50	Rumker . . 2800	. .	0.5	13.0	25.5	. .	8 37 12.98	−6.62	1 58.96	8.45	Bar. red. to 32° F. 27.916		
51	Mars . . . S.F.	. .	32.0	44.5	57.0	. .	8 38 44.48	+1.81					
52	Rumker . . 2800	. .	31.2	43.8	56.2	. .	8 40 43.72	−6.72	−1 59.24	+8.53			

Remarks.

There is evidently considerable haze, varying in density, though not enough to affect the image of the planet prejudicially. Motion steady, and measures of the planet satisfactory; but the star is very dim.

a Just visible.

Results.

Mean S. F. . . . Twenty-six transits . . 7 46 23.82 h. m. s. — 1 57.598 m. s. . . . . + 7.872 Rev. . . . . 2 33.42 ′ ″

Correction for chronometer at 7 46 h m. . . . — 1 46.23 m. s. Santiago sid. time S. F. . . . . 7 44 37.59 h. m. s.

Δ ρ at 7 46 h. m. . . . . 0.16 ″

DECEMBER 28, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . . 275	. .	. .	46.0	. .	. .	7 12 45.96	+3.56			28.051	54.7	50.4
2	Mars . . . S.F.	. .	. .	24.5	. .	. .	7 13 24.46	−2.63	+38.50	−6.19			
3	Bessel . . . 275	. .	. .	54.5	. .	. .	7 14 54.46	+3.26			Ther. att. 63°.0		
4	Mars . . . N.P.	. .	. .	32.0	. .	. .	7 15 31.96	−1.93	37.50	5.19	Bar. red. to 32° F. 27.959		
5	Bessel . . . 275	. .	. .	59.5	. .	. .	7 16 59.46	+3.09					
6	Mars . . . S.F.	. .	. .	38.0	. .	. .	7 17 37.96	−2.89½	38.50	5.98½			
7	Bessel . . . 275	. .	. .	15.3	. .	. .	7 19 15.26	+2.85					
8	Mars . . . N.P.	. .	. .	53.3	. .	. .	7 19 53.26	−2.20	38.00	5.05			
9	Bessel . . . 275	. .	. .	32.0	. .	. .	7 21 31.96	+2.69					
10 *a*	Mars . . . S.F.	. .	. .	6.8	. .	. .	7 22 6.76	−3.25	34.80	5.94			
11	Bessel . . . 275	. .	. .	44.0	. .	. .	7 23 43.96	+2.55½					
12	Mars . . . N.P.	. .	. .	21.5	. .	. .	7 24 21.46	−2.54	37.50	5.09½			
13	Bessel . . . 275	. .	. .	11.0	. .	. .	7 27 10.96	+2.32½					
14	Mars . . . S.F.	. .	. .	49.3	. .	. .	7 27 49.26	−3.56	38.30	5.88½			
15	Bessel . . . 275	. .	. .	17.9	. .	. .	7 29 17.86	+2.14					
16	Mars . . . N.P.	. .	. .	55.3	. .	. .	7 29 55.26	−2.81	37.40	4.95			
17	Bessel . . . 275	. .	. .	34.0	. .	. .	7 31 33.96	+2.02					
18	Mars . . . S.F.	. .	. .	12.2	. .	. .	7 32 12.16	−3.80	38.20	5.82			
19	Bessel . . . 275	. .	. .	54.2	. .	. .	7 33 54.16	+1.87½					
20	Mars . . . N.P.	. .	. .	31.0	. .	. .	7 34 30.96	−3.03½	36.80	4.91			
21	Bessel . . . 275	. .	. .	28.0	. .	. .	7 38 27.96	+1.46½					
22	Mars . . . S.F.	. .	. .	6.3	. .	. .	7 39 6.26	−4.11½	+38.30	−5.58			

DECEMBER 28, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
23	Bessel . . . 275	. .	. .	45.1	. .	. .	7 40 45.06	+1.41			28.051	54.7	50.4
24	Mars . . . N.P.	. .	. .	21.8	. .	. .	7 41 21.76	—3.41	+36.70	—4.82			
25	Bessel . . . 275	. .	. .	40.2	. .	. .	7 42 40.16	+1.36			Ther. att. 63°.0		
26	Mars . . . S.F.	. .	. .	18.0	. .	. .	7 43 17.96	—4.29	37.80	5.65	Bar. red. to 32° F.		
27	Bessel . . . 275	. .	. .	41.0	. .	. .	7 44 40.96	+1.25½			27.959		
28	Mars . . . N.P.	. .	. .	17.8	. .	. .	7 45 17.76	—3.56	36.80	4.81½			
29	Bessel . . . 275	. .	. .	30.4	. .	. .	7 47 30.36	+1.12½					
30	Mars . . . S.F.	. .	. .	8.3	. .	. .	7 48 8.26	—4.49	37.90	5.61½			
31	Bessel . . . 275	. .	. .	38.3	. .	. .	7 49 38.26	+3.26					
32	Mars . . . N.P.	. .	. .	14.6	. .	. .	7 50 14.56	—1.43	36.30	4.69			
33	Bessel . . . 275	. .	. .	41.6	. .	. .	7 51 41.56	+3.16					
34	Mars . . . S.F.	. .	. .	19.2	. .	. .	7 52 19.16	—2.40	37.60	5.56			
35	Bessel . . . 275	. .	. .	39.5	. .	. .	7 53 39.46	+3.06					
36	Mars . . . N.P.	. .	. .	16.0	. .	. .	7 54 15.96	—1.59½	36.50	4.65½			
37	Bessel . . . 275	. .	. .	22.4	. .	. .	7 56 22.36	+2.93					
38	Mars . . . S.F.	. .	. .	0.3	. .	. .	7 57 0.26	—2.54	37.90	5.47			
39	Bessel . . . 275	. .	. .	18.0	. .	. .	7 58 17.96	+2.82½					
40	Mars . . . N.P.	. .	. .	54.3	. .	. .	7 58 54.26	—1.79½	36.30	4.62			
41	Bessel . . . 275	. .	. .	13.0	. .	. .	8 0 12.96	+2.69					
42	Mars . . . S.F.	. .	. .	50.3	. .	. .	8 0 50.26	—2.71	37.30	5.40			
43	Bessel . . . 275	. .	. .	7.1	. .	. .	8 2 7.06	+2.64					
44	Mars . . . N.P.	. .	. .	43.1	. .	. .	8 2 43.06	—1.92	36.00	4.56			
45	Bessel . . . 275	. .	. .	49.0	. .	. .	8 3 48.96	+2.58					
46	Mars . . . S.F.	. .	. .	26.0	. .	. .	8 4 25.96	—2.81	37.00	5.39			
47	Bessel . . . 275	. .	. .	20.3	. .	. .	8 5 20.26	+2.50					
48	Mars . . . N.P.	. .	. .	56.3	. .	. .	8 5 56.26	—2.00	36.00	4.50			
49	Bessel . . . 275	. .	. .	57.0	. .	. .	8 6 56.96	+2.45					
50	Mars . . . S.F.	. .	. .	34.4	. .	. .	8 7 34.36	—2.92	37.40	5.37			
51	Bessel . . . 275	. .	. .	58.7	. .	. .	8 8 58.66	+2.37					
52	Mars . . . N.P.	. .	. .	34.4	. .	. .	8 9 34.36	—2.07	35.70	4.44			
53	Bessel . . . 275	. .	. .	38.1	. .	. .	8 10 38.06	+2.35					
54	Mars . . . S.F.	. .	. .	15.5	. .	. .	8 11 15.46	—3.00	37.40	5.35			
55	Bessel . . . 275	. .	. .	57.5	. .	. .	8 13 57.46	+2.25					
56	Mars . . . N.P.	. .	. .	33.5	. .	. .	8 14 33.46	—2.22	36.00	4.47			
57	Bessel . . . 275	. .	. .	38.7	. .	. .	8 15 38.66	+2.14					
58	Mars . . . S.F.	. .	. .	15.5	. .	. .	8 16 15.46	—3.15	36.80	5.29			
59	Bessel . . . 275	. .	. .	24.4	. .	. .	8 17 24.36	+2.09					
60	Mars . . . N.P.	. .	. .	0.0	. .	. .	8 17 59.96	—2.27½	35.60	4.36½			
61	Bessel . . . 275	. .	. .	9.5	. .	. .	8 21 9.46	+1.92½					
62	Mars . . . S.F.	. .	. .	45.7	. .	. .	8 21 45.66	—3.23	36.20	5.15½			
63	Bessel . . . 275	. .	. .	49.4	. .	. .	8 22 49.36	+1.85					
64	Mars . . . N.P.	. .	. .	24.8	. .	. .	8 23 24.76	—2.42	35.40	4.27			
65	Bessel . . . 275	. .	. .	30.4	. .	. .	8 24 30.36	+1.81					
66	Mars . . . S.F.	. .	. .	7.0	. .	. .	8 25 6.96	—3.33	36.60	5.14			
67	Bessel . . . 275	. .	. .	10.0	. .	. .	8 26 9.96	+1.77					
68	Mars . . . N.P.	. .	. .	45.4	. .	. .	8 26 45.36	—2.45	+35.40	—4.22			

DECEMBER 28, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
69	Bessel . . . 275	. .	. .	50.4	. .	. .	8 27 50.36	+1.73			28.051	54.7	50.4
70	Mars . . . S.F.	. .	. .	26.8	. .	. .	8 28 26.76	−3.35½	+36.40	−5.08½			
71	Bessel . . . 275	. .	. .	24.0	. .	. .	8 29 23.96	+1.71			Ther. att. 63°.0		
72	Mars . . . N.P.	. .	. .	59.0	. .	. .	8 29 58.96	−2.55	35.00	4.26	Bar. red. to 32° F. 27.959		
73	Bessel . . . 275	. .	. .	43.0	. .	. .	8 31 42.96	+1.65½					
74	Mars . . . S.F.	. .	. .	19.3	. .	. .	8 32 19.26	−3.37½	36.30	5.03			
75	Bessel . . . 275	. .	. .	5.0	. .	. .	8 33 4.96	+1.60½					
76	Mars . . . N.P.	. .	. .	39.7	. .	. .	8 33 39.66	−2.54½	34.70	4.15			
77	Bessel . . . 275	. .	. .	28.0	. .	. .	8 34 27.96	+1.60					
78	Mars . . . S.F.	. .	. .	4.5	. .	. .	8 35 4.46	−3.39	36.50	4.99			
79	Bessel . . . 275	. .	. .	55.0	. .	. .	8 35 54.96	+1.57					
80	Mars . . . N.P.	. .	. .	30.0	. .	. .	8 36 29.96	−2.56½	35.00	4.13½			
81	Bessel . . . 275	. .	. .	14.5	. .	. .	8 37 14.46	+1.58					
82	Mars . . . S.F.	. .	. .	50.5	. .	. .	8 37 50.46	−3.41½	36.00	4.99½			
83	Bessel . . . 275	. .	. .	46.7	. .	. .	8 38 46.66	+1.55					
84	Mars . . . N.P.	. .	. .	21.6	. .	. .	8 39 21.56	−2.53	+34.90	−4.08			

Remarks.

Images sharp and steady, and measures satisfactory. The line bounding the white zone not so dark as when last observed. Dark patches visible on the south preceding quadrant.

a Evidently in error, and therefore rejected.

Results.

	h. m. s.
Mean S. F. . . Twenty transits . .	8 0 35.54
Mean N. P. . . Twenty-one transits .	8 0 42.12

h. m.	m. s.
Correction for chronometer at 8 1	−1 50.20
Correction for chronometer at 8 1	−1 50.20

	″
Δ P. F. limbs in A. R. reduced to arc . . .	17.67
Variation of A. R in 7*s*.	− 0.03
Observed P. F. diameter	17.64

h. m. ″

Δ ρ at 7 58 . . . . 0.09

m. s.	Rev.	′ ″
+ 37.345	− 5.447	= 1 46.16
+ 36.167	− 4.583	= 1 29.32

	h. m. s.
Santiago sid. time S. F.	7 58 45.34
Santiago sid. time N. P.	7 58 51.92
Interval	6.58

	″
Δ N. S. limbs micr. in rev. . . . . . . 0.864 =	16.84
Variation of declination in 7*s*.	− 0.02
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	14.62

h. m. ″

Δ ρ at 7 58 . . . . 0.07

DECEMBER 29, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . N.P.	. .	10.3	23.0	35.5	. .	6 47 22.92	+3.71½			28.068	54.3	52.3
2	Rumker . . 2799	. .	29.5	42.1	54.5	. .	6 50 42.02	2.65	−3 19.10	+1.06½			
3	Mars . . . S.F.	. .	1.0	13.5	26.1	. .	6 52 13.52	2.88			Ther. att. 63°.0		
4	Rumker . . 2799	. .	18.8	31.5	44.5	. .	6 55 31.58	+2.43	−3 18.06	+0.45	Bar. red. to 32° F. 27.976		

DECEMBER 29, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
5	Mars . . . N.P.	. .	56.0	8.5	21.0	. .	6 57 8.48	+3.92			28.080	54.5	52.3
6	Rumker . . 2799	. .	15.5	28.0	40.5	.	7 0 27.98	2.64	—3 19.50	+1.28			
7	Mars . . . S.F.	. .	44.0	56.5	9.0	. .	7 1 56.48	3.04			Ther. att. 62°.5		
8	Rumker . . 2799	. .	2.6	15.6	28.0	. .	7 5 15.38	2.43	3 18.90	0.61	Bar. red. to 32° F. 27.990		
9	Mars . . . N.P.	. .	35.2	47.8	0.5	. .	7 6 47.82	3.60					
10	Rumker . . 2799	. .	55.3	7.8	20.5	. .	7 10 7.85	2.08	3 20.03	1.52			
11	Mars . . . S.F.	. .	4.5	17.2	29.8	. .	7 12 17.15	2.42½					
12	Rumker . . 2799	. .	23.7	36.3	48.8	. .	7 15 36.25	1.56½	3 19.10	0.86			
13 *a*	Mars . . . N.P.	. .	6.0	18.5	31.0	. .	7 17 18.48	2.82					
14	Rumker . . 2799	. .	26.2	38.8	51.2	. .	7 20 38.72	1.25	3 20.24	1.57			
15	Mars . . . S.F.	. .	20.4	33.0	45.5	. .	7 22 32.95	1.84					
16	Rumker . . 2799	. .	40.0	52.5	5.2	. .	7 25 52.55	0.95	3 19.60	0.89			
17	Mars . . . N.P.	. .	14.3	26.8	39.3	. .	7 27 26.78	2.38½					
18	Rumker . . 2799	. .	35.0	47.5	0.0	. .	7 30 47.48	0.61	3 20.70	1.77½			
19	Mars . . . S.F.	. .	14.0	26.8	39.3	. .	7 34 26.68	3.71					
20	Rumker . . 2799	. .	34.0	46.6	59.2	. .	7 37 46.58	2.70	3 19.90	1.01			
21	Mars . . . N.P.	. .	15.3	27.8	40.3	. .	7 46 27.78	3.68½					
22	Rumker . . 2799	. .	36.5	49.0	1.5	. .	7 49 48.98	1.67	3 21.20	2.01½			
23	Mars . . . S.F.	. .	16.0	28.5	41.0	. .	7 51 23.48	2.70					
24	Rumker . . 2799	. .	36.2	48.8	1.4	. .	7 54 48.78	1.43½	3 20.30	1.26½			
25	Mars . . . N.P.	. .	12.0	24.6	37.2	. .	7 56 24.58	3.34					
26	Rumker . . 2799	. .	33.5	46.5	58.8	. .	7 59 46.25	1.25	3 21.67	2.09			
27	Mars . . . S.F.	. .	5.8	18.3	30.9	. .	8 1 18.32	2.37					
28	Rumker . . 2799	. .	26.6	39.2	51.6	. .	8 4 39.12	1.00½	3 20.80	1.36½			
29	Mars . . . N.P.	. .	14.2	26.6	39.4	. .	8 6 26.72	3.05					
30	Rumker . . 2799	. .	36.3	49.9	1.4	. .	8 9 49.18	0.83½	3 22.46	2.21½			
31	Mars . . . S.F.	. .	3.0	15.6	28.1	. .	8 11 15.55	2.16½					
32	Rumker . . 2799	. .	24.2	36.7	49.3	. .	8 14 36.72	0.62½	3 21.17	1.54			
33 *b*	Mars . . . N.P.	. .	7.5	20.3	32.6	. .	8 16 20.12	5.13					
34	Rumker . . 2799	. .	30.0	42.6	54.0	. .	8 19 42.18	2.78½	3 22.06	2.34½			
35 *c*	Mars . . . S.F.	. .	52.8	5.3	17.8	. .	8 22 5.28	4.07					
36	Rumker . . 2799	. .	14.5	27.0	39.5	. .	8 25 26.98	+2.43	—3 21.70	+1.64			

Remarks.

Up to the moment of commencing work, the images, and particularly of Mars, were flaring and unsteady. Afterwards they became more satisfactory, and finally excellent.

a Very sharp, but wavy.

b Barely visible through clouds.

c Interrupted by clouds.

Results.

		h. m. s.	m. s.	Rev.	″
Mean N. P. . . .	Nine transits . . .	7 31 18.19	— 3 20.773 . . .	+ 1.764	= 34.38
Mean S. F. . . .	Nine transits . . .	7 36 37.16	— 3 19.948 . . .	+ 1.070	= 20.85

	h. m.	m. s.
Correction for chronometer at	7 31 . . .	— 1 53.49
Correction for chronometer at	7 36 . . .	— 1 53.51

	h. m. s.
Santiago sid. time N. P.	7 29 24.70
Santiago sid. time S. F.	7 34 43.65
Interval	5 18.95

DECEMBER 29, 1851—Continued.

Results—Continued.

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	12.38	Δ N. S. limbs micr. in rev. . . . . . . 0.694 =	13.53
Variation of A. R. in 5*m*. 19*s*.	+ 2.56	Variation of declination in 5*m*. 19*s*. . .	+ 1.28
Observed P. F. diameter	14.94	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	12.61
h. m.	″	h. m.	″
Δ ρ at 7 31	0.03	Δ ρ at 7 36	0.02

DECEMBER 30, 1851.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . .	S.F.	. .	37.0	49.0	1.5	. .	6 40 49.15	+14.00			28.054	54.5	52.2
2	Rumker . .	2799	. .	43.5	55.0	7.5	. .	6 44 55.32	— 4.44	—4 6.17	+18.44			
3	Mars . . .	N.P.	. .	6.5	18.5	30.5	. .	6 47 18.48	+14.42			Ther. att. 66.°4		
4	Rumker . .	2799	. .	13.0	26.0	38.5	. .	6 51 25.81	— 4.98	4 7.33	19.40	Bar. red. to 32° F. 27.952		
5	Mars . . .	S.F.	. .	4.0	16.5	29.3	. .	6 53 16.58	+13.17½					
6	Rumker . .	2799	. .	10.5	23.0	35.6	. .	6 57 23.02	— 5.45	4 6.44	18.62½			
7	Mars . . .	N.P.	. .	53.8	6.5	19.1	. .	6 59 6.45	+13.64					
8	Rumker . .	2799	. .	1.5	14.0	26.5	. .	7 3 13.98	— 5.86	4 7.53	19.50			
9	Mars . . .	S.F.	. .	32.3	44.8	57.5	. .	7 4 44.85	+12.42					
10	Rumker . .	2799	. .	38.8	. .	4.0	. .	7 8 51.39	— 6.42½	4 6.54	18.84½			
11	Mars . . .	N.P.	. .	48.5	1.0	13.5	. .	7 11 0.98	+12.93½					
12	Rumker . .	2799	. .	56.7	9.0	21.5	. .	7 15 9.05	— 6.81	4 8.07	19.74½			
13	Mars . . .	S.F.	. .	44.0	56.8	9.3	. .	7 16 56.68	+11.74					
14	Rumker . .	2799	. .	51.2	4.0	16.5	. .	7 21 3.88	— 7.25½	4 7.20	18.99½			
15	Mars . . .	N.P.	. .	39.4	52.0	4.5	. .	7 22 51.95	+12.20					
16	Rumker . .	2799	. .	47.8	0.5	13.1	. .	7 27 0.45	— 7.63½	4 8.50	19.83½			
17	Mars . . .	S.F.	. .	30.0	42.5	55.1	. .	7 28 42.52	+11.14½					
18	Rumker . .	2799	. .	37.7	50.4	3.0	. .	7 32 50.35	— 7.99½	4 7.83	19.14			
19	Mars . . .	N.P.	. .	55.2	7.8	20.4	. .	7 35 7.78	+11.58					
20	Rumker . .	2799	. .	4.5	17.2	29.8	. .	7 39 17.15	— 8.38	4 9.37	19.96			
21	Mars . . .	S.F.	. .	50.0	2.5	15.0	. .	7 41 2.48	+10.63½					
22	Rumker . .	2799	. .	58.0	10.6	23.0	. .	7 45 10.52	— 8.66	4 8.04	19.29½			
23	Mars . . .	N.P.	. .	1.5	14.3	26.6	. .	7 47 14.12	+11.04½					
24	Rumker . .	2799	. .	11.3	23.8	36.5	. .	7 51 23.85	— 9.06	4 9.73	20.10½			
25	Mars . . .	S.F.	.	6.9	19.5	32.0	. .	7 53 19.45	+10.03½					
26	Rumker . .	2799	. .	15.5	28.2	40.6	. .	7 57 28.09	— 9.36½	4 8.64	19.40			
27 *a*	Mars . . .	N.P.	. .	3.0	15.7	28.0	. .	7 59 15.55	+10.67½					
28	Rumker . .	2799	. .	13.3	25.8	38.4	. .	8 3 25.82	— 9.63	4 10.27	20.30½			
29	Mars . . .	S.F.	. .	16.4	28.8	41.4	. .	8 5 28.85	+ 9.72					
30	Rumker . .	2799	. .	25.5	38.0	50.6	. .	8 9 38.02	— 9.86	4 9.17	19.58			
31 *b*	Mars . . .	N.P.	. .	4.5	16.8	29.5	. .	8 11 16.92	+10.37					
32	Rumker . .	2799	. .	14.8	27.2	40.0	. .	8 15 27.32	—10.16½	4 10.40	20.53½			
33	Mars . . .	S.F.	. .	44.5	57.0	9.5	. .	8 16 56.98	+ 9.48					
34	Rumker . .	2799	. .	54.0	6.6	19.1	. .	8 21 6.55	—10.33	—4 9.57	+19.81			

DECEMBER 30, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h m. s.	Rev.	m. s.	Rev.	Inches.	°	°
35	Mars . . . N.P.	. .	56.6	9.2	21.7	. .	8 23 9.15	+10.25			28.040	54.5	52.2
36	Rumker . . 2799	. .	7.5	20.0	32.6	. .	8 27 20.02	−10.41½	−4 10.87	+20.63½			
37	Mars . . . S.F.	. .	50.3	3.0	15.5	. .	8 29 2.92	+ 9.29			Ther. att 66°.4 Bar red to 32° F. 27.938		
38	Rumker . . 2799	. .	0.2	12.8	25.3	. .	8 33 12.75	−10.56	4 9.83	19.85			
39	Mars . . . N.P.	. .	27.0	39.6	52.2	. .	8 34 39.58	+10.03					
40	Rumker . . 2799	. .	38.4	51.0	3.5	. .	8 38 50.95	−10.71	−4 11.37	+20.74			

Remarks.

Fine night. Images sharp and clear; but a fresh wind from the northward occasionally created tremor in the instrument.

a Flaring and unsteady. *b* Steady and sharp again.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	7 35 2.05	−4 7.943	+19.198	=6 14.17
Mean N. P.	7 41 6.10	−4 9.344	+20.079	=6 31.34

	h. m.	m. s.
Correction for chronometer at	7 35	−1 56.25
Correction for chronometer at	7 41	−1 56.26

	h. m. s.
Santiago sid. time S. F.	7 33 5.80
Santiago sid. time N. P.	7 39 9.84
Interval	6 4.04

	″
Δ P. F. limbs in A. R. reduced to arc	21.01
Variation of A. R. in 6*m.* 4*s.*	− 3.11
Observed P. F. diameter	17.90

	″
Δ N. S. limbs micr. in rev.	0.881 = 17.17
Variation of declination in 6*m.* 4*s.*	− 1.49
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	13.48

	h. m.	″
Δ ρ at	7 35	0.33
Δ ρ at	7 41	0.34

DECEMBER 31, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	. .	34.8	. .	. .	6 54 34.76	−5.07			27.975	61.4	52.0
2	Bessel . . . 277	. .	. .	13.0	. .	. .	6 55 12.96	+7.32½	−38.20	−12.42½			
3	Mars . . . N.P.	. .	. .	41.0	. .	. .	6 56 40.96	−4.65			Ther. att. 68°.4 Bar. red. to 32° F. 27.867		
4	Bessel . . . 277	. .	. .	19.8	. .	. .	6 57 19.76	+7.10	38.80	11.75			
5	Mars . . . S.F.	. .	. .	58.8	. .	. .	6 58 58.76	−5.61½					
6	Bessel . . . 277	. .	. .	36.0	. .	. .	6 59 35.96	+7.04	37.20	12.65½			
7	Mars . . . N.P.	. .	. .	25.7	. .	. .	7 1 25.66	−4.88½					
8	Bessel . . . 277	. .	. .	4.2	. .	. .	7 2 4.16	+6.77	38.50	11.65½			
9	Mars . . . S.F.	. .	. .	8.2	. .	. .	7 5 8.16	−6.03½					
10	Bessel . . . 277	. .	. .	45.6	. .	. .	7 5 45.56	+6.38½	37.40	12.42			
11	Mars . . . N.P.	. .	. .	3.5	. .	. .	7 8 3.46	−5.34					
12	Bessel . . . 277	. .	. .	42.0	. .	. .	7 8 41.96	+6.29½	−38.50	−11.62½			

DECEMBER 31, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
13	Mars . . . S.F.	. .	. .	22.3	. .	. .	7 10 22.26	—6.36			27.975	61.4	52.0
14	Bessel . . . 277	. .	. .	0.5	. .	. .	7 11 0.46	+6.13½	—38.20	—12.49½			
15	Mars . . . N.P.	. .	. .	44 0	. .	. .	7 12 43.96	—5.31			Ther. att. 68°.4 Bar. red. to 32° F 27.867		
16	Bessel . . . 277	. .	. .	22.8	. .	. .	7 13 22.76	+5.88½	38.80	11.19½			
17	Mars . . . S.F.	. .	. .	46.3	. .	. .	7 15 46.26	—6.60					
18	Bessel . . 277	. .	. .	24.2	. .	. .	7 16 24.16	+5.67½	37.90	12.27½			
19	Mars . . . N.P	. .	. .	48.3	. .	. .	7 18 48.26	—6.03½					
20	Bessel . . . 277	. .	. .	27.5	. .	. .	7 19 27.46	+5.45	39.20	11.48½			
21	Mars . . . S.F.	. .	. .	17.3	. .	. .	7 21 17.26	—7.02					
22	Bessel . . . 277	. .	. .	55.4	. .	. .	7 21 55.36	+5.27½	38.10	12.29½			
23	Mars . . . N.P.	. .	. .	58.1	. .	. .	7 23 58.06	—6.22					
24	Bessel . . . 277	. .	. .	37.8	. .	. .	7 24 37.76	+5.14	39.70	11.36			
25	Mars . . . S.F.	. .	. .	11.0	. .	. .	7 26 10.96	—7.16					
26	Bessel . . . 277	. .	. .	49.5	. .	. .	7 26 49.46	+4.99½	38.50	12.15½			
27	Mars . . . N.P.	. .	.	15.5	. .	. .	7 28 15.46	—6.44					
28	Bessel . . . 277	. .	. .	54.5	. .	. .	7 28 54.46	+4.87	39.00	11.31			
29 a	Mars . . . S.F.	. .	. .	15.3	. .	. .	7 30 15.26	—7.35½					
30	Bessel . . . 277	. .	. .	54.5	. .	. .	7 30 54.46	+4.74½	39.20	12.10			
31 a	Mars . . . N.P.	. .	. .	9.3	. .	. .	7 33 9.26	—6.63					
32	Bessel . . . 277	. .	. .	49.3	. .	. .	7 33 49.26	+4.49	40.00	11.12			
33	Mars . . . S.F.	. .	. .	15.5	. .	. .	7 35 15.46	—7.69					
34	Bessel . . . 277	. .	. .	53.6	. .	. .	7 35 53.56	+4.31½	38.10	12.00½			
35	Mars . . . N.P.	. .	. .	7.5	. .	. .	7 38 7.46	—6.95					
36	Bessel . . . 277	. .	. .	48.3	. .	. .	7 38 48.26	+4.25½	40.80	11.20½			
37	Mars . . . S.F.	. .	. .	17.8	. .	. .	7 41 17.76	—7.92					
38	Bessel . . . 277	. .	. .	56.4	. .	. .	7 41 56.36	+4.09	38.60	12.01			
39	Mars . . . N.P.	. .	. .	39.5	. .	. .	7 43 39.46	—7.12					
40	Bessel . . . 277	. .	. .	19.5	. .	. .	7 44 19.46	+4.01½	40.00	11.13½			
41	Mars . . . S.F.	. .	. .	24.6	. .	. .	7 46 24.56	—8.10					
42	Bessel . . . 277	. .	. .	3.5	. .	. .	7 47 3.46	+3.87	38.90	11.97			
43	Mars . . . N.P.	. .	. .	4.8	. .	. .	7 54 4.76	—7.71½					
44	Bessel . . 277	. .	. .	46.5	. .	. .	7 54 46.46	+3.24½	41.70	10.96			
45	Mars . . . S.F.	. .	. .	26.5	. .	. .	8 11 26.46	—9.06					
46	Bessel . . . 277	. .	. .	6.6	. .	. .	8 12 6.56	+2.56	40.10	11.62			
47	Mars . . . N.P.	. .	. .	17.0	. .	. .	8 13 16.96	—8.82					
48	Bessel . . . 277	. .	. .	58.6	. .	. .	8 13 58.56	+1.89½	41.60	10.71½			
49	Mars . . . S.F.	. .	. .	15.6	. .	. .	8 15 15.56	—9.66					
50	Bessel . . . 277	. .	. .	56.0	. .	. .	8 15 55.96	+1.88	40.40	11.54	27.976	58.5	51.8
51	Mars . . . N.P.	. .	. .	32.0	. .	. .	8 17 31.96	—9.09			Ther. att. 66°.0 Bar. red. to 32° F. 27.875		
52	Bessel . . . 277	. .	. .	13.2	. .	. .	8 18 13.16	+1.60½	41.20	10.69½			
53	Mars . . . S.F.	. .	. .	10.8	. .	. .	8 25 10.76	—10.41					
54	Bessel . . . 277	. .	. .	51.5	. .	. .	8 25 51.46	+ 0.95	—40.70	—11.36			

Remarks.

Fine night. Images clean and steady. There is so little difference in right ascension that the measures are made hastily, and not so well as is desirable. Observations stopped by breakage of pin in universal joint of right ascension rod.

a Wavy.

DECEMBER 31, 1851—Continued.

Results.

	h. m. s.	s.	Rev.	′ ″
Mean N. P.	7 31 31.21	—39.831	—11.269 . . .	=3 39.63
Mean S. F.	7 32 40.30	—38.679	—12.095 . . .	=3 55.73

	m. s.		h. m. s.
Correction for chronometer at 7 31 (h. m.) . . .	—1 58.42	Santiago sid. time N. P.	7 29 32.39
Correction for chronometer at 7 32 . . .	—1 58.42	Santiago sid. time S. F.	7 30 41.48
		Interval	1 9.09

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	17.28	Δ N. S. limbs micr. in rev.	0.826 = 16.10
Variation of A. R. in 1*m*. 9*s*.	— 0.63	Variation of declination in 1*m*. 9*s*. . .	— 0.30
Observed P. F. diameter	16.65	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	13.60

h. m.	″	h. m.	″
Δ ρ at 7 30	0.20	Δ ρ at 7 31	0.21

JANUARY 1, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	39.8	52.5	5.0	. .	7 3 52.43	—4.71			27.955	61.3	54.7
2	Bessel . . . 277	. .	10.3	23.5	36.0	. .	7 5 23.27	+2.25	—1 30.84	—6.96			
3	Mars . . . N.P.	. .	23.0	35.5	48.2	. .	7 8 35.57	—4.14			Ther. att. 68°.2 Bar. red. to 32° F. 27.848		
4	Bessel . . . 277	. .	55.0	7.6	20.2	. .	7 10 7.60	+1.84½	1 32.03	5.98½			
5	Mars . . . S.F.	. .	0.5	13.5	26.0	. .	7 12 13.33	—5.35					
6	Bessel . . . 277	. .	31.8	44.5	57.0	. .	7 13 44.43	+1.54	1 31.10	6.89			
7	Mars . . . N.P.	. .	43.6	56.5	9.0	. .	7 15 56.37	—4.62½					
8	Bessel . . . 277	. .	16.1	28.6	41.0	. .	7 17 28.57	+1.33½	1 32.20	5.96			
9	Mars . . . S.F.	. .	16.8	29.8	42.3	. .	7 22 29 63	—3.08					
10	Bessel . . . 277	. .	48.1	0.6	13.5	. .	7 24 0.73	+3.60	1 31.10	6.68			
11	Mars . . . N.P.	. .	14.8	27.7	40.3	. .	7 25 27.60	—2.68					
12	Bessel . . . 277	. .	47.6	0.0	12 6	. .	7 27 0.07	+3.19	1 32.47	5.87			
13	Mars . . . S.F.	. .	22.4	34.8	47.5	. .	7 28 34.90	—3.56					
14	Bessel . . . 277	. .	54.0	6.5	19.2	. .	7 30 6.57	+3.03	1 31.67	6.59			
15	Mars . . . N.P.	. .	21.2	33.8	47.0	. .	7 31 34.00	—3.93					
16 *a*	Bessel . . . 277	. .	54.0	6.5	19.2	. .	7 33 6.57	+1.87½	1 32.57	5.80½			
17	Mars . . . S.F.	. .	35.2	48.0	0.2	. .	7 34 47.80	—3.90½					
18	Bessel . . . 277	. .	7.0	19.6	32.2	. .	7 36 19.60	+2.66	1 31.80	6.56½			
19	Mars . . . N.P.	. .	2.5	15.3	27.5	. .	7 39 15.10	—3.31					
20	Bessel . . . 277	. .	35.8	48.4	1.0	. .	7 40 48.40	+2.39	1 33.30	5.70			
21	Mars . . . S.F.	. .	18.2	30.6	43.4	. .	7 42 30.73	—4.36					
22	Bessel . . . 277	. .	50.5	3.2	15.8	. .	7 44 3.17	+2.02	1 32.44	6.38			
23	Mars . . . N.P	. .	22.0	34.5	47.2	. .	7 45 34.57	—3.50					
24	Bessel . . . 277	. .	55.5	8.0	20.5	. .	7 47 8.00	+2.08½	1 33.43	5.58½			
25	Mars . . . S.F.	. .	56.2	8.6	21.3	. .	7 49 8.70	—4.24½					
26	Bessel . . . 277	. .	28.5	41.1	53.6	. .	7 50 41.07	+2.12	1 33.37	6.36½			
27	Mars . . . N.P.	. .	59.1	11.5	24.0	. .	7 52 11.53	—3.77					
28	Bessel . . . 277	. .	33.0	45.5	58.2	. .	7 53 45.57	+1.67.	1 34.04	5.44			
29	Mars . . . S.F.	. .	19.0	31.6	44.3	. .	7 55 31.63	—4.76					
30	Bessel . . . 277	. .	52.1	4.6	17.0	. .	7 57 4.57	+1.43	—1 32.94	—6.19			

JANUARY 1, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
31	Mars . . .	N P.	. .	17.2	29.8	42.4	. .	7 58 29.80	—3.91½			27.972	59.8	54.3
32	Bessel . . .	277	. .	51.3	4.0	16.6	. .	8 0 3.97	+1.40	—1 34.17	—5.31½			
33	Mars . . .	S.F.	. .	15.2	27.8	40.3	. .	8 1 27.77	—4.84½			Ther. att. 64°.5 Bar red. to 32° F. 27.876		
34	Bessel . . .	277	. .	48.4	1.0	13.5	. .	8 3 0.97	+1.32	1 33.20	6.16½			
35	Mars . . .	N.P.	. .	30.8	43.5	56.0	. .	8 4 43.43	—0.82					
36	Bessel . . .	277	. .	6.3	18.0	30.5	.	8 6 18.27	+4.47	1 34.84	5.29			
37	Mars . . .	S.F.	. .	49.0	1.7	14.3	. .	8 8 1.67	—1.67½					
38	Bessel . .	277	. .	22.5	35.1	47.6	. .	8 9 35.07	+4.39	1 33.40	6.06½			
39	Mars . . .	N.P	. .	42.5	55.0	7.5	. .	8 10 55.00	—0.95½					
40	Bessel . . .	277	. .	17.0	29.7	42.1	. .	8 12 29.60	+4.27	1 34.60	5.22½			
41	Mars . . .	S F.	. .	47.5	0.2	12.6	. .	8 14 0.10	—1.85					
42	Bessel . . .	277	. .	21.0	33.6	46.2	. .	8 15 33.60	+4.19	1 33.50	6.04			
43	Mars . . .	N P.	. .	49.5	2.0	14.7	. .	8 17 2.07	—1.06					
44	Bessel . . .	277	. .	24.5	37.0	49.7	. .	8 18 37.07	+4.12	1 35.00	5.18			
45	Mars . . .	S.F.	. .	48.0	0.7	13.5	. .	8 21 0.73	—1.98½					
46	Bessel . . .	277	. .	22.0	34.6	47.0	. .	8 22 34.53	+3.93	1 33.80	5.91½			
47	Mars . . .	N.P.	. .	12.6	25.3	37.8	. .	8 24 25.23	—1.16½					
48	Bessel . . .	277	. .	47.6	0.5	13.0	. .	8 26 0.37	+3.82½	1 35.14	4.99			
49	Mars . . .	S.F.	. .	17.1	29.8	42.3	. .	8 27 29.73	—2.02					
50	Bessel . . .	277	. .	51.4	4.0	16.5	. .	8 29 3.97	+3.72½	1 34.24	5.74½			
51	Mars . . .	N.P.	. .	8.0	20.5	33.2	. .	8 30 20.57	—1.25					
52	Bessel . . .	277	. .	43.2	56.0	8.5	. .	8 31 55.90	+3.69½	1 35.33	4.94½			
53	Mars . . .	S F.	. .	8.6	21.0	33.5	. .	8 33 21.03	—2.10					
54	Bessel . .	277	. .	42.5	55.3	7.8	. .	8 34 55.20	+3.64	1 34.17	5.74			
55	Mars . . .	N.P.	. .	1.1	13.6	26.3	. .	8 36 13.67	—1.23					
56	Bessel . . .	277	. .	36.6	49.2	2.0	. .	8 37 49.27	+3.60	1 35.60	4.83			
57	Mars . . .	S F.	. .	39.8	52.4	4.8	. .	8 38 52.33	—2.04					
58	Bessel . . .	277	. .	14.3	26.8	39.3	. .	8 40 26.80	+3.63	1 34.47	5.67			
59	Mars . . .	N.P.	. .	19.5	32.0	44.6	. .	8 41 32.03	—1.26					
60	Bessel . . .	277	. .	55.0	7.7	20.2	. .	8 43 7.63	+3.57	—1 35.60	—4.83			

Remarks.

Superb night, and very satisfactory measures.

a Micrometer recorded 2.87½ rev.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	7 54 13.50	—1 32.736	— 6.264	2 2.08
Mean N. P.	7 57 29.10	—1 34.021	— 5.397	1 45.19

h. m.	m. s.
Correction for chronometer at 7 54 . .	—2 1.02
Correction for chronometer at 7 57 . . .	—2 1.02

	h. m. s.
Santiago sid. time S. F.	7 52 12.48
Santiago sid. time N. P.	7 55 28.08
Interval	3 15.60

	″
Δ P. F. limbs in A. R. reduced to arc . . .	19.27
Variation of A. R. in 3*m*. 16*s*	— 1.89
Observed P. F. diameter	17.38

	″
Δ N. S. limbs micr. in rev.	0.867 = 16.90
Variation of declination in 3*m*. 16*s*. . .	— 0.85
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	13.85

h. m.	″
Δ ρ at 7 53	0.10
Δ ρ at 7 56	0.09

JANUARY 2, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	275	. .	13.6	26.5	39.0	. .	6 24 26.37	+5.59			27.948	62.5	56.2
2	Mars . . .	S.F.	. .	50.8	3.0	16.0	. .	6 27 3.27	3.47	+2 36.90	—2.12			
3	Bessel . . .	275	. .	17.5	30.2	43.2	. .	6 30 30.30	5.15			Ther. att. 68°.7		
4	Mars . . .	N.P.	. .	53.0	5.6	18.4	. .	6 33 5.67	3.91½	2 35.37	1.23½	Bar. red. to 32° F. 27.839		
5	Bessel . . .	275	. .	34.3	47.0	59.5	. .	6 34 46.93	4.78½					
6	Mars . . .	S.F.	. .	10.6	23.5	36.0	. .	6 37 23.37	2.68	2 36.44	2.10½			
7	Bessel . . .	275	. .	1.3	13.5	26.5	. .	6 39 13.77	4.33					
8	Mars . . .	N.P.	. .	36.3	49.5	1.5	. .	6 41 49.10	3.26	2 35.33	1.07			
9	Bessel . . .	275	. .	11.8	24.4	37.6	. .	6 43 24.60	3.98					
10	Mars . . .	S.F.	. .	48.2	0.6	13.3	. .	6 46 0.70	2.07	2 36.10	1.91			
11	Bessel . . .	275	. .	25.5	38.0	50.6	. .	6 47 38.03	3.60					
12	Mars . . .	N.P.	. .	0.5	13.0	25.5	. .	6 50 13.00	2.53½	2 34.97	1.06½			
13	Bessel . . .	275	. .	30.6	43.3	56.0	. .	6 51 43.30	3.26					
14	Mars . . .	S.F.	. .	6.6	19.2	31.8	. .	6 54 19.20	1.48	2 35.90	1.78			
15	Bessel . . .	275	. .	50.0	2.6	15.2	. .	6 56 2.60	2.99					
16	Mars . . .	N.P.	. .	. .	37.0	49.5	. .	6 58 36.94	2.07	2 34.34	0.92			
17	Bessel . . .	275	. .	59.5	12.0	24.5	. .	7 0 12.00	2.64					
18	Mars . . .	S.F.	. .	34.8	47.4	0.0	. .	7 2 47.40	1.02	2 35.40	1.62			
19	Bessel . . .	275	. .	3.0	15.5	28.0	. .	7 4 15.50	2.17½					
20	Mars . . .	N.P.	. .	36.8	49.4	2.0	. .	7 6 49.40	1.43½	2 33.90	0.74			
21	Bessel . . .	275	. .	13.4	25.8	38.4	. .	7 8 25.87	2.01½					
22	Mars . . .	S.F.	. .	48.0	0.5	13.5	. .	7 11 0.67	0.50	2 34.80	1.51½			
23	Bessel . . .	275	. .	9.5	22.2	34.8	. .	7 14 22.17	6.46½					
24	Mars . . .	N.P.	. .	43.0	55.8	8.5	. .	7 16 55.77	5.89	2 33.60	0.57½			
25	Bessel . . .	275	. .	12.5	25.0	37.5	. .	7 18 25.00	6.22½					
26	Mars . . .	S.F.	. .	46.8	59.3	11.9	. .	7 20 59.33	4.84	2 34.33	1.38½			
27	Bessel . . .	275	. .	10.5	23.0	35.6	. .	7 22 23.03	5.97½					
28	Mars . . .	N.P.	. .	43.8	56.4	9.0	. .	7 24 56.40	5.44	2 33.37	0.53½			
29	Bessel . . .	275	. .	5.5	18.0	30.5	. .	7 26 18.00	5.70½					
30	Mars . . .	S.F.	. .	39.5	52.0	4.5	. .	7 28 52.00	4.41	2 34.00	1.26½			
31	Bessel . . .	275	. .	28.6	41.3	54.0	. .	7 33 41.30	5.32½					
32	Mars . . .	N.P.	. .	1.5	14.0	26.6	. .	7 36 14.03	5.00	2 32.73	0.32½			
33	Bessel . . .	275	. .	2.3	15.0	27.5	. .	7 38 14.93	5.13					
34	Mars . . .	S.F.	. .	36.0	48.6	1.2	. .	7 40 48.60	4.02½	2 33.67	1.10½			
35	Bessel . . .	275	. .	58.3	11.0	23.6	. .	7 42 10.97	4.94					
36	Mars . . .	N.P.	. .	30.8	43.5	56.0	. .	7 44 43.43	4.71	2 32.46	0.23			
37	Bessel . . .	275	. .	6.2	18.8	31.3	. .	7 46 18.77	4.69					
38	Mars . . .	S.F.	. .	39.5	52.2	4.6	. .	7 48 52.10	3.72	2 33.33	0.97			
39	Bessel . . .	275	. .	55.5	8.1	20.6	. .	7 50 8.07	4.34					
40	Mars . . .	N.P.	. .	27.6	40.3	52.8	. .	7 52 40.23	4.25	2 32.16	0.09			
41	Bessel . . .	275	. .	45.0	57.5	10.0	. .	7 53 57.50	4.27					
42	Mars . . .	S.F.	. .	18.0	30.6	43.2	. .	7 56 30.60	3.45	2 33.10	0.82			
43	Bessel . . .	275	. .	41.0	53.5	6.2	. .	7 57 53.57	4.14					
44	Mars . . .	N.P.	. .	12.5	25.1	37.8	. .	8 0 25.13	4.14	2 31.56	0.00			
45	Bessel . . .	275	. .	41.5	54.3	6.8	. .	8 1 54.20	3.97					
46	Mars . .	S.F.	. .	14.4	27.0	39.6	. .	8 4 27.00	+3.17	+2 32.80	—0.80			

JANUARY 2, 1852—Continued.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 275	. .	33.7	46.5	59.0	. .	8 5 46.40	+3.80½			27.944	58.0	55.3
48	Mars . . . N.P.	. .	5.1	17.8	30.4	. .	8 8 17.77	3.90	+2 31.37	+0.09½			
49	Bessel . . . 275	. .	32.8	45.5	58.0	. .	8 9 45.43	3.65			Ther. att. 68°.0 Bar. red. to 32° F. 27.835		
50	Mars . . . S.F.	. .	5.5	17.9	30.3	. .	8 12 17.90	2.99	2 32.47	—0.66			
51	Bessel . . . 275	. .	21.8	34.1	47.0	. .	8 13 34.30	3.58½					
52	Mars . . . N.P.	. .	52.8	5.4	18.0	. .	8 16 5.40	3.81½	2 31.10	+0.23			
53	Bessel . . . 275	. .	9.0	21.6	34.3	. .	8 17 21.63	3.50					
54	Mars . . . S.F.	. .	41.0	53.5	6.2	. .	8 19 53.57	2.95½	2 31.94	—0.54½			
55	Bessel . . . 275	. .	58.8	11.5	24.1	. .	8 21 11.47	3.35					
56	Mars . . . N.P.	. .	29.5	42.2	54.6	. .	8 23 42.10	3.68	2 30.63	+0.33			
57	Bessel . . . 275	. .	49.0	1.8	14.3	. .	8 25 1.70	3.27					
58	Mars . . . S.F.	. .	20.6	33.3	46.0	. .	8 27 33.30	2.77	2 31.60	—0.50			
59	Bessel . . . 275	. .	35.5	48.3	0.8	. .	8 28 48.20	3.20					
60	Mars . . . N.P.	. .	4.8	18.5	31.0	. .	8 31 18.10	3.68	2 29.90	+0.48			
61	Bessel . . . 275	. .	23.5	36.1	48.8	. .	8 32 36.13	3.18½					
62	Mars . . . S.F.	. .	54.8	7.5	20.0	. .	8 35 7.43	2.82½	2 31.30	—0.36			
63	Bessel . . . 275	. .	22.6	35.3	47.8	. .	8 36 35.23	3.14					
64	Mars . . . N.P.	. .	52.6	5.3	17.8	. .	8 39 5.23	+3.69	+2 30.00	+0.55			

Remarks.

Night and observations same as preceding.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	7 33 22.28	+2 34.005	—1.216	=0 23.70
Mean N. P.	7 37 48.61	+2 32.674	—0.319	=0 6.22

	m. s.		h. m. s.
Correction for chronometer at 7 33 (h. m.) . . .	—2 4.24	Santiago sid. time S. F.	7 31 18.04
Correction for chronometer at 7 37 . . .	—2 4.25	Santiago sid. time N. P.	7 35 44.36
		Interval	4 26.32

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	19.96	Δ N. S. limbs mic. in rev.	0.897 = 17.48
Variation of A. R. in 4*m*. 26*s*.	— 2.72	Variation of declination in 4*m*. 26*s*. . .	— 1.18
Observed P. F. diameter	17.24	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	14.10

h. m.	″	h. m.	″
Δ ρ at 7 30	0.02	Δ ρ at 7 34	0.00

JANUARY 3, 1852.

Cloudy.

JANUARY 4, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ	Bar.	Thermometers Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Mars . . . S.F.	. .	47.6	0.3	13.5	25.7	6 35 0.46	+4.69			28.096	58.5	55.0
2	H. C. . . . 18132	. .	15.0	28.0	40.5	53.3	6 40 27.88	−1.78½	−5 27.42	+6.47½			
	Mars . . . N.P.	21.0	33.5	46.0	58.5	11.5	6 42 46.10	+4.97			Ther. att. 65°.7		
4	H. C. . . . 18132	49.8	2.5	15.2	27.8	40.5	6 48 15.16	−2.47	5 29.06	7.44	Bar. red. to 32° F.		
5 *b*	Mars . . . S.F.	35.5	48.2	1.0	13.6	26.5	6 50 0.96	+3.22			27.996		
6	H. C. . . . 18132	3.5	16.5	29.0	41.7	54.5	6 55 29.04	−3.35½	5 28.08	6.57½			
7	Mars . . . N.P.	9.0	21.6	34.2	46.8	59.6	6 57 34.24	+3.72					
8	H. C. . . . 18132	38.5	51.0	3.8	16.6	29.5	7 3 3 88	−3.87	5 29.64	7.59			
9	Mars . . . S.F.	18.8	31.5	44.0	56.5	9.5	7 8 44.06	+2.24					
10	H. C. . . . 18132	48.0	0.5	13.5	26.0	38.5	7 14 13.30	−4.68½	5 29.24	6.92½			
11	Mars . . . N.P.	9.7	22.7	35.3	47.9	0.5	7 16 35.22	+2.61					
12	H. C. . . . 18132	40.5	53.2	6.0	18.5	31.3	7 22 5.90	−5.34	5 30.68	7.95			
13	Mars . . . S.F.	25.5	38.2	51.0	3.5	16.4	7 23 50.92	+1.41					
14	H. C. . . . 18132	55.5	8.1	21.0	33.6	46.2	7 29 20.88	−5.75½	5 29.96	7.16½			
15 *c*	Mars . . . N.P.	5.2	17.8	30.5	43.3	56.0	7 31 30.56	+1.90					
16	H. C. . . . 18132	36.5	49.5	2.0	14.6	27.4	7 37 2.00	−6.14	5 31.44	8.04			
17	Mars . . . S.F.	41.6	54.2	6.8	19.5	32.3	7 39 6.88	+0.81					
18	H. C. . . . 18132	12.0	24.7	37.5	50.3	3.0	7 44 37.50	−6.62	5 30.62	7.43			
19	Mars . . . N.P.	20.3	33.0	45.6	58.0	11.0	7 46 45.58	+4.36					
20	H. C. . . . 18132	52.5	5.0	17.8	30.4	43.2	7 52 17.78	−3.84	5 32.20	8.20			
21	Mars . . . S.F.	38.6	51.3	3.5	16.5	29.4	7 54 3.86	+3.17					
22	H. C. . . . 18132	10.3	23.0	35.8	48.2	0.8	7 59 35.62	−4.39	5 31.76	7.56			
23 *d*	Mars . . . N.P.	1.9	14.6	27.3	39.9	52.6	8 1 27.26	+3.82					
24	H. C. . . . 18132	34.6	47.5	0.3	13.0	25.8	8 7 0.24	−4.76½	5 32.98	8.58½			
25	Mars . . . S.F.	33.2	45.8	58.5	11.0	23.8	8 8 58.46	+2.80					
26	H. C. . . . 18132	5.0	18.0	30.5	43.2	56.0	8 14 30.54	−5.02	5 32.08	7.82			
27	Mars . . . N.P.	5.6	18.5	31.5	44.2	57.0	8 16 31.36	+3.39					
28	H. C. . . . 18132	. .	52.5	5.2	17.8	30.5	8 22 5.18	−5.33	5 33.82	8.72			
29	Mars . . . S.F.	35.5	51.2	4.0	16.5	29.5	8 24 3.94	+2.52			28.089	54.7	52.0
30	H. C. . . . 18132	11.5	24.2	36.8	49.3	2.0	8 29 36.76	−5.50½	5 32.82	8.02½	Ther. att. 64°.6		
31	Mars . . . N.P.	51.0	3.6	16.5	29.0	41.8	8 32 16.38	+3.34			Bar. red. to 32° F.		
32	H. C. . . . 18132	25.1	38.0	50.8	3.5	16.3	8 37 50.74	−5.62	−5 34.36	+8.96	27.992		

Remarks.

a Flaring. *b* Flaring and tremulous. *c* Sharp. *d* Steady. All following measures fine.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	7 30 28.70	−5 30.247 . .	. +7.247	=2 21.24
Mean N. P.	7 38 10.84	−5 31.773 . . .	+8.186	=2 39.54

h. m.	m. s.
Correction for chronometer at 7 30 . .	−2 10.70
Correction for chronometer at 7 38 . . .	−2 10.72

	h. m. s.
Santiago sid. time S. F.	7 28 18.00
Santiago sid. time N. P.	7 36 0.12
Interval	7 42.12

	″
Δ P. F. limbs in A. R. reduced to arc . . .	22.89
Variation of A. R. in 7*m*. 42*s*.	− 5.23
Observed P. F. diameter	17.66

	″
Δ N. S. limbs micr. in rev.	0.939 = 18.30
Variation of declination in 7*m*. 42*s*. . .	− 2.14
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	13.96

h. m.	″
Δ ρ at 7 31	0.13
Δ ρ at 7 39	0.14

JANUARY 5, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . .	S.F.	. .	15.5	28.2	41.0	. .	7 4 28.23	+ 3.02			28.021	71.5	58.7
2	Bessel . . .	278	. .	2.5	. .	28.0	. .	7 6 15.26	+13.94½	—1 47.03	—10.92½			
3	Mars . . .	N P.	36.5	49.2	2.0	14.7	27.5	7 9 1.98	—4.20			Ther. att. 67°.0		
4	Bessel . . .	278	24.5	37.3	50.0	2.7	15.5	7 10 50.00	+5.71	1 48.02	9.91	Bar. red. to 32° F.		
5	Mars . . .	S.F.	44.5	57.2	10.0	22.5	35.4	7 14 9.92	—5.41			27.917		
6	Bessel . . .	278	. .	44.7	57.4	10.0	22.6	7 15 57.35	+5.31	1 47.43	10.72			
7	Mars . . .	N P.	24.5	37.0	49.6	2.3	15.0	7 17 49.68	—5.23					
8	Bessel . . .	278	13.0	25.6	38.0	50.8	3.5	7 19 38.18	+5.05½	1 48.50	10.28½			
9	Mars . . .	S.F.	. .	44.8	57.4	10.0	22.5	7 21 57.35	—5.73					
10	Bessel . . .	278	20.0	32.8	45.5	58.0	10.6	7 23 45.38	+4.85½	1 48.03	10.56			
11	Mars . . .	N.P.	9.8	22.6	35.3	48.0	0.5	7 25 35.24	—5.06½					
12	Bessel . . .	278	59.0	11.6	24.4	37.0	50.0	7 27 24.40	+4.62½	1 49.16	9.69			
13	Mars . . .	S.F.	19.5	32.4	45.0	57.6	10.5	7 29 45.00	—6.10					
14	Bessel . . .	278	7.5	20 5	33.3	45.7	58.5	7 31 33.10	+4.37½	1 48.10	10.47½			
15	Mars . . .	N P.	21.5	34.2	46.8	59.3	12.0	7 34 46.76	—5.47					
16	Bessel . . .	278	10.5	23.5	36.0	48.5	1.2	7 36 35.94	+4.14	1 49.18	9.61			
17 a	Mars . . .	S.F.	11.5	24.5	37.0	49.8	2.3	7 38 37.02	—6.42					
18	Bessel . . .	278	0.0	12.5	25.3	37.6	50.7	7 40 25.22	+3.97	1 48.20	10.39			
19	Mars . . .	N.P.	13.6	26.5	39.3	52.0	4.5	7 43 39.18	—5.81½					
20	Bessel . . .	278	3.5	16.4	29.2	41.6	54.6	7 45 29.06	+3.74	1 49.88	9.55½			
21	Mars . . .	S.F.	0.5	13.0	26.0	38.6	51.5	7 48 25.92	—6.84					
22	Bessel . . .	278	49.8	2.5	15.1	27.8	40.5	7 50 15.14	+3.33	1 49.22	10.17			
23	Mars . . .	N.P.	12.5	25.4	38.0	5.5	3.3	7 55 37.94	—6.17					
24	Bessel . . .	278	3.0	15.8	28.5	41.0	53.8	7 57 28.42	+3.18	1 50.48	9.35			
25	Mars . . .	S.F.	56.5	9.2	22.0	34.5	47.5	7 59 21.94	—7.07½					
26	Bessel . . .	278	46.3	59.0	11.5	24.2	36.8	8 1 11.56	+3.00	1 49.62	10.07½			
27	Mars . . .	N.P.	42.6	55.3	7.8	20.3	33.0	8 3 7.80	—6.33					
28	Bessel . . .	278	33.1	46.0	58.6	11.2	24.0	8 4 58.58	+2.85½	1 50.78	9.18½			
29	Mars . . .	S.F.	35.0	47.6	1.4	13.8	26.7	8 7 0.90	—7.21					
30	Bessel . . .	278	24.6	37.5	51.2	3.8	16.8	8 8 50.78	+2.76	1 49.88	9.97			
31	Mars . . .	N.P.	35.8	48.5	1.2	13.7	26.5	8 12 1.14	—6.47					
32	Bessel .	278	27.0	39.6	52.4	5.0	17.8	8 13 52.36	+2.59	1 51.22	9.06			
33	Mars . . .	S.F.	25.5	38.2	50.6	3.4	16.3	8 15 50.80	—7.33					
34	Bessel . . .	278	15.5	28.4	41.1	53.6	6.5	8 17 41.02	+2.51	1 50.22	9.84			
35	Mars .	N.P.	34.1	46.7	59.4	11.8	24.8	8 19 59.36	—6.58					
36	Bessel . . .	278	25.6	38.3	51.0	3.7	16.5	8 21 51.02	+2.37	1 51.66	8.95	28.009	57.0	52.0
37	Mars . . .	S.F.	. .	27.7	40.2	52.5	5.6	8 23 40.17	—7.40			Ther. att. 67.°0		
38	Bessel . . .	278	5.5	18.3	31.0	43.7	56.5	8 25 31.00	+2.29	1 50.83	9.69	Bar. red. to 32° F.		
39	Mars . . .	N.P.	2.6	15.4	28.1	40.5	53.3	8 27 27.98	—6.57			27.905		
40	Bessel . . .	278	54.5	7.1	20.0	32.6	45.5	8 29 19.94	+2.30	—1 51.96	—8.87			

Remarks.

There was no sharp image during the observations, and the planet was slightly tremulous and wavy all the time.

a Blurred and tremulous.

JANUARY 5, 1852—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Ten transits . . .	7 44 19.72	—1 48.856 . . .	—10.284 . . .	=3 20.43
Mean N. P. . . .	Ten transits . . .	7 48 54.70	—1 50.084 . . .	— 9.446 . . .	=3 4.10

	m. s.		h. m. s.
Correction for chronometer at 7h 44m . . .	—2 13.44	Santiago sid. time S. F.	7 42 6.28
Correction for chronometer at 7h 49m . . .	—2 13.48	Santiago sid. time N. P.	7 46 41.22
		Interval	4 34.94

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	18.42	Δ N. S. limbs micr. in rev.	0.838=16.33
Variation of A. R. in 4*m*. 35*s*.	— 3.25	Variation of declination in 4*m*. 35*s*. . .	— 1.28
Observed P. F. diameter	15.17	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	12.85

	″		″
Δ ρ at 7h 43m	0.19	Δ ρ at 7h 48m	0.16

JANUARY 6, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α	Δ δ	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	278	19.5	32.2	45.0	57.5	10.2	7 12 44.88	+2.96½			27.929	65.0	56.4
2	Mars . . .	S.F.	3.5	15.8	28.5	41.2	54.0	7 15 28.60	—1.31	+2 43.72	—4.27½			
3	Bessel . . .	278	22.5	35.2	48.0	0.6	13.5	7 17 47.96	+2.49			Ther. att. 69°.7		
4	Mars . . .	N.P.	. .	17.6	30.3	42.9	55.6	7 20 30.27	—0.85½	2 42.31	3.34½	Bar. red. to 32° F. 27.817		
5	Bessel . . .	278	39.0	51.6	4.2	17.0	29.9	7 23 4.34	+2.25					
6	Mars . . .	S.F.	22.0	34.6	47.3	0.0	13.0	7 25 47.38	—1.78	2 43.04	4.03			
7	Bessel . . .	278	15.0	28.0	40.7	53.3	6.0	7 27 40.60	+2.07					
8	Mars . . .	N.P.	56.9	9.5	22.3	35.0	47.7	7 30 22.28	—1.13	2 41.68	3.20			
9	Bessel . . .	278	. .	49.2	1.7	14.0	26.8	7 32 1.60	+1.70					
10	Mars . . .	S.F.	18.5	31.2	43.7	56.5	9.3	7 34 43.84	—2.18	2 42.24	3.88			
11	Bessel . . .	278	2.0	14.7	27.5	40.2	53.0	7 36 27.48	+1.52					
12	Mars . . .	N.P.	43.2	56.0	8.6	21.2	34.0	7 39 8.60	—1.50	2 41.12	3.02			
13	Bessel . . .	278	. .	49.4	2.2	14.7	27.5	7 41 2.12	+1.32					
14	Mars . . .	S.F.	18.5	31.4	44.3	56.5	9.6	7 43 44.06	—2.44	2 41.94	3.76			
15	Bessel . . .	278	54.0	7.2	20.0	33.0	45.7	7 46 19.98	+0.89½					
16	Mars . . .	N.P.	. .	47.6	0.7	13.5	26.4	7 49 0.72	—1.94	2 40.74	2.83½			
17	Bessel . . .	278	26.5	39.0	51.6	4.5	17.5	8 8 51.82	1.91					
18	Mars . . .	S.F.	7.2	19.6	32.5	45.2	58.0	8 11 32.50	5.18	2 40.68	3.27			
19	Bessel . . .	278	5.0	17.8	30.5	43.2	56.0	8 13 30.50	2.04					
20	Mars . . .	N.P.	44.3	57.0	9.8	22.5	35.2	8 16 9.76	4.50	2 39.26	2.46			
21	Bessel . . .	278	42.4	55.3	7.9	20.5	33.3	8 18 7.88	2.07½					
22	Mars . . .	S.F.	22.6	35.3	48.0	0.6	13.5	8 20 48.00	5.24½	2 40.12	3.17			
23	Bessel . . .	278	30.8	43.8	56.5	8.8	21.5	8 22 56.28	2.14½					
24	Mars . . .	N.P.	9.6	22.4	35.2	47.8	0.5	8 25 35.10	4.45½	2 38.82	2.31			
25	Bessel . . .	278	4.0	16.8	29.5	42.5	55.0	8 29 29.56	2.23					
26	Mars . . .	S.F.	43.5	56.0	8.6	21.5	34.3	8 32 8.78	5.29	2 39.22	3.06			
27	Bessel . . .	278	20.0	32.6	45.8	58.5	11.2	8 34 45.62	2.24					
28	Mars . . .	N.P.	58.5	11.2	24.0	36.5	49.3	8 37 23.90	4.40	2 38.28	2.16			
29	Bessel . . .	278	. .	50.0	2.6	15.5	28.2	8 39 2.74	2.33					
30	Mars . . .	S.F.	16.5	29.2	42.0	54.3	7.2	8 41 41.84	5.18	2 39.10	2.85			
31	Bessel . . .	278	. .	53.0	5.6	18.4	31.5	8 43 5.79	2.28½					
32	Mars . . .	N.P.	18.2	30.8	43.5	56.0	9.0	8 45 43.50	—4.30	+2 37.71	—2.01½			

JANUARY 6, 1852—Continued.

Remarks.

Until the total eclipse of the moon, although both objects were sharp and without tremor, their images were dim. At no time during the eclipse could a distinct shadow be seen on the moon; and its color, varying in patches at different times as though passing through penumbræ of different densities, was from that of a light to a dark red copper.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Eight transits . . .	7 58 14.37	+ 2 41.257	— 3.537	1 8.94
Mean N. P. . . .	Eight transits . . .	8 2 59.27	+ 2 39.990	— 2.668	0 52.00

	m. s.		h. m. s.
Correction for chronometer at 7 58 (h. m.) . . .	— 2 16.63	Santiago sid. time S. F.	7 55 57.74
Correction for chronometer at 8 3 . . .	— 2 16.64	Santiago sid. time N. P.	8 0 42.63
		Interval	4 44.89

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	19.00	Δ N. S. limbs micr. in rev.	0.856 = 16.94
Variation of A. R. in 4*m.* 45*s.*	— 3.51	Variation of declination in 4*m.* 45*s.* .	— 1.38
Observed P. F. diameter	15.49	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	13.36

	″		″
Δ ρ at 7 55 (h. m.)	0.07	Δ ρ at 7 59 (h. m.)	0.04

JANUARY 7, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	278	34.5	47.0	59.8	12.5	25.2	6 48 59.80	+6.55			27.960	58.2	54.3
2 *a*	Mars . . .	S.F.	28.2	41.0	53.5	6.3	19.2	6 53 53.64	—7.61	+4 53.84	—14.16			
3	Bessel . .	278	21.5	34.3	47.0	59.7	12.4	6 58 46.98	+5.13			Ther. att. 66°.3 Bar. red. to 32° F. 27.858		
4 *a*	Mars . . .	N.P.	13.6	26.8	39.2	52.0	4.5	7 3 39.22	—8.00	4 52.24	13.13			
5	Bessel . . .	278	22.8	35.8	48.3	0.6	13.5	7 5 48.20	+4.70					
6 *b*	Mars . . .	S.F.	15.6	28.8	41.2	53.6	6.6	7 10 41.16	—9.18½	4 52.96	13.88½			
7	Bessel . . .	278	41.0	53.8	6.5	19.0	32.0	7 13 6.46	+7.42					
8	Mars . . .	N.P.	32.5	45.3	58.0	10.5	23.5	7 17 57.96	—5.58	4 51.50	13.00			
9 *c*	Bessel . . .	278	47.7	0.5	13.3	25.8	38.6	7 20 13.18	+7.05					
10	Mars . . .	S.F.	40.2	52.8	5.5	18.2	31.0	7 25 5.54	—6.62	4 52.36	13.67			
11	Bessel . . .	278	19.5	32.3	45.0	57.5	10.3	7 27 44.92	+6.63½					
12	Mars . . .	N.P.	10.1	22.8	35.5	48.2	1.0	7 32 35.52	—6.12	4 50.60	12.75½			
13	Bessel . . .	278	22.0	34.7	47.3	0.0	12.7	7 34 47.34	+6.32					
14	Mars . . .	S.F.	13.3	26.0	38.5	51.3	4.2	7 39 38.66	—7.20	4 51.32	13.52			
15	Bessel . . .	278	20.3	33.0	45.8	58.5	11.2	7 41 45.76	+5.87					
16 *d*	Mars . . .	N.P.	10.0	22.8	35.6	48.2	0.8	7 46 35.48	—6.61½	4 49.72	12.48½			
17	Bessel . . .	278	42.0	54.6	7.5	20.0	32.8	7 49 7.38	+5.68					
18	Mars . . .	S.F.	32.5	45.3	58.0	10.5	23.5	7 53 57.96	—7.53	4 50.58	13.21			
19	Bessel . . .	278	6.0	18.8	31.3	44.0	56.6	7 56 31.34	+5.45½					
20	Mars . . .	N.P.	55.5	8.2	20.8	33.4	46.0	8 1 20.78	—6.84	4 49.44	12.29½			
21	Bessel . . .	278	5.2	18.0	30.6	43.3	56.1	8 3 30.64	+5.26					
22	Mars . . .	S.F.	55.0	7.5	20.6	33.0	46.0	8 8 20.42	—7.76½	4 49.78	13.02½			
23	Bessel . . .	278	30.8	43.5	56.2	9.0	21.7	8 10 56.24	+5.07½					
24 *e*	Mars . . .	N.P.	18.2	32.0	44.6	37.3	10.0	8 15 44.49	—7.01	+4 48.18	—12.08½			

JANUARY 7, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
25	Bessel . . . 278	18.5	31.2	44.0	56.4	9.0	8 17 43.82	+4.98			27.940	55.2	52.3
26	Mars . . . S.F.	7.5	20.4	33.0	45.6	58.4	8 22 32.98	—7.82	+4 49.16	—12.80			
27	Bessel . . . 278	56.0	8.7	21.5	34.0	46.8	8 24 21.40	+4.83½			Ther. att. 65°.0		
28 *f*	Mars . . . N.P.	43.6	56.5	9.2	21.8	34.5	8 29 9.12	—7.01	4 47.72	11.84½	Bar. red. to 32° F. 27.842		
29	Bessel . . . 278	. .	46.6	59.0	11.8	21.5	8 30 59.14	+4.82					
30	Mars . . . S.F.	22.5	35.0	47.6	0.3	13.1	8 35 47.70	—7.77	4 48.56	12.59			
31	Bessel . . . 278	6.2	19.0	31.6	44.2	57.0	8 37 31.60	+4.82					
32	Mars . . . N.P.	53.5	5.9	18.5	31.3	44.0	8 42 18.64	—6.84	+4 47.04	—11.66			

Remarks.

a Blurred and tremulous.
b Worse.
c Tolerably good, though wavy.
d Dim and blurred again.
e Steady.
f Good.

Results.

		h. m. s.
Mean S. F. . .	Eight transits . . .	7 46 14.76
Mean N. P. . .	Eight transits . . .	7 53 40.14

	m. s.	Rev.	′ ″
	+ 4 51.070 . . .	— 13.357	= 4 20.33
	+ 4 49.555 . . .	— 12.407	= 4 1.81

h. m.	m. s.
Correction for chronometer at 7 46	— 2 19.98
Correction for chronometer at 7 54	— 2 19.99

	h. m. s.
Santiago sid. time S. F.	7 43 54.78
Santiago sid. time N. P.	7 51 20.15
Interval	7 25.37

	″
Δ P. F. limbs in A. R. reduced to arc . . .	22.72
Variation of A. R. in 7*m.* 25*s.*	— 5.71
Observed P. F. diameter	17.01

	″
Δ N. S. limbs micr. in rev. . . . . . . 0.950 =	18.52
Variation of declination in 7*m.* 25*s.* . .	— 2.17
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	14.15

h. m.	″
Δ ρ at 7 41	0.24

h. m.	″
Δ ρ at 7 49	0.21

JANUARY 8, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Bessel . . . 278	6.2	19.0	31.6	44.3	57.1	6 25 31.64	—3.67½			28.012	56.0	51.0
2	Mars . . . N.P.	45.5	57.6	10.5	23.2	36.0	6 29 10.56	+4.45	+3 38.92	+8.12½			
3	Bessel . . . 278	52.2	5.0	17.8	30.5	44.0	6 31 17.90	—4.10			Ther. att. 62°.6		
4	Mars . . . S.F.	32.2	44.6	57.6	10.2	23.0	6 34 57.52	+3.11½	3 39.62	7.21½	Bar. red. to 32° F. 27.920		
5	Bessel . . . 278	14.2	27.0	39.7	52.3	5.0	6 37 39.64	—4.75					
6	Mars . . . N.P.	53.0	5.5	18.0	30.7	44.0	6 41 18.24	+3.52	3 38.60	8.27			
7	Bessel . . . 278	32.5	45.3	58.0	. .	23.4	6 43 57.96	—5.24					
8	Mars . . . S.F.	11.3	24.0	36.8	49.5	2.3	6 47 36.78	+2.31	3 38.82	7.55			
9	Bessel . . . 278	27.2	40.0	52.8	5.4	18.2	6 49 52.72	—5.70½					
10	Mars . . . N.P.	5.0	17.5	30.3	42.8	55.5	6 53 30.22	+2.75	+3 37.50	+8.45½			

JANUARY 8, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	Bessel . . . 278	32.6	45.3	58.0	10.7	23.4	6 55 58.00	—6.18			27.982	53.0	50.7
12	Mars . . . S.F.	10.8	23.5	36.2	48.7	1.7	6 59 36.18	+1.61	+3 38.18	+7.79			
13	Bessel . . . 278	28.2	41.0	53.6	6.3	19.0	7 1 53.62	—3.67			Ther. att. 60°.0 Bar. red. to 32° F. 27.900		
14	Mars . . . N.P.	5.0	17.8	30.5	43.2	55.6	7 5 30.42	+4.92½	3 36.80	8.59½			
15	Bessel . . . 278	23.2	35.9	48.5	1.2	14.0	7 8 48.56	—4.20					
16	Mars . . S.F.	0.5	13.4	26.2	38.8	51.5	7 12 26.08	+3.81	3 37.52	8.01			
17	Bessel . . . 278	7.0	19.8	32.4	45.0	57.8	7 14 32.40	—4.61					
18	Mars . . . N.P.	43.4	56.0	8.8	21.3	34.2	7 18 8.74	+4.23½	3 36.34	8.84½			
19	Bessel . . . 278	47.0	59.8	12.4	24.8	37.5	7 20 12.30	—4.87					
20	Mars . . . S.F.	24.0	36.5	49.3	1.9	14.8	7 23 49.30	+3.22½	3 37.00	8.09½			
21 *b*	Bessel . . . 278	49.5	2.5	15.0	27.5	40.4	7 34 14.98	—4.26					
22	Mars . . . N.P.	24.5	37.0	50.0	2.5	15.5	7 37 49.90	+4.90	3 34.92	9.16			
23 *c*	Bessel . . . 278	29.2	42.1	54.9	7.5	20.4	7 39 54.82	—4.45½					
24	Mars . . . S.F.	5.3	18.0	30.6	43.3	56.2	7 43 30.68	+4.02	3 35.86	8.47½			
25	Bessel . . . 278	9.6	22.5	35.1	47.8	0.5	7 45 35.10	—4.64½					
26	Mars . . . N.P.	44.0	56.8	9.6	22.0	35.0	7 49 9.48	+4.60½	3 34.38	9.25			
27	Bessel . . . 278	6.5	19.2	31.8	44.5	57.3	7 51 31.86	—4.87½					
28	Mars . . . S.F.	41.5	54.5	7.2	19.8	32.5	7 55 7.10	+3.77½	3 35.24	8.65			
29	Bessel . . . 278	. .	51.3	4.2	16.8	29.8	7 57 4.19	—5.05					
30	Mars . . . N.P.	12.5	25.2	38.0	50.7	3.3	8 0 37.94	+4.50½	3 33.75	9.55½			
31	Bessel . . . 278	17.5	30.2	43.0	55.7	8.2	8 2 42.92	—5.14					
32	Mars . . . S.F.	51.7	4.6	17.2	29.8	42.3	8 6 17.12	+3.67½	3 34.20	8.81½			
33 *d*	Bessel . . . 278	16.8	29.5	42.2	54.8	7.6	8 8 42.18	—5.24					
34	Mars . . . N.P.	50.0	2.5	15.3	27.7	40.4	8 12 15.18	+4.46	3 33.00	9.70			
35	Bessel . . . 278	37.0	50.0	2.8	15.5	28.2	8 15 2.70	—5.38½					
36	Mars . . . S.F.	11.5	24.0	36.8	49.4	2.3	8 18 36.80	+3.63	3 34.10	9.01½			
37	Bessel . . . 278	2.6	15.4	28.0	40.6	53.4	8 20 28.00	—5.41½					
38	Mars . . . N.P.	35.0	47.7	0.5	13.2	25.7	8 24 0.42	+4.45	3 32.42	9.86½			
39 *e*	Bessel . . . 278	36.2	48.7	1.5	14.3	27.0	8 26 1.54	—5.48					
40	Mars . . . S.F.	9.5	22.2	34.8	47.5	0.2	8 29 34.84	+3.70	3 33.30	9.18			
41	Bessel . . . 278	53.0	5.6	18.4	31.1	43.8	8 31 18.38	—5.48					
42	Mars . . . N.P.	. .	37.3	50.2	2.7	15.5	8 34 50.09	+4.56	3 31.71	10.04			
43	Bessel . . . 278	15.5	28.3	41.0	53.6	6.5	8 36 40.98	—5.44½					
44	Mars . . . S.F.	48.2	1.0	13.6	26.2	39.0	8 40 13.60	+3.87	+3 32.62	+9.31½			

Remarks.

a During all the observations to No. 20 inclusive, both objects were badly defined and wavy.

b Recorded 17.5*s*. at wire D.

c Slightly improving.

d Better.

e All the rest good measures.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	First five transits . .	6 53 31.64	+ 3 37.632 . . .	+ 8.458	= 2 44.95
Mean S. F. . . .	First five transits . .	6 59 41.17	3 38.228 . . .	7.732	2 30.60
Mean N. P. . . .	Last six transits . .	8 6 27.17	3 33.363 . . .	9.595	3 7.01
Mean S. F. . . .	Last six transits . .	8 12 13.36	+ 3 34.220 . . .	+ 8.908	= 2 53.62

JANUARY 8, 1852—Continued.

Results—Continued.

	h. m.	m. s.
Correction for chronometer at	6 54	−2 22.66
Correction for chronometer at	7 0	−2 22.67

	h. m. s.
Santiago sid. time N. P.	6 51 8.98
Santiago sid. time S. F.	6 57 18.50
Interval	6 9.52

	″
Δ P. F. limbs in A. R. reduced to arc	8.94
Variation of A. R. in 6*m*. 10*s*.	+ 4.92
Observed P. F. diameter	13.86

	″
Δ N. S. limbs micr. in rev.	0.726 = 14.15
Variation of declination in 6*m*. 10*s*.	+ 1.82
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	13.77

	h. m.	m. s.
Correction for chronometer at	8 6	−2 22.80
Correction for chronometer at	8 12	−2 22.81

	h. m. s.
Santiago sid. time N. P.	8 4 4.37
Santiago sid. time S. F.	8 9 50.55
Interval	5 46.18

	″
Δ P. F. limbs in A. R. reduced to arc	12.85
Variation of A. R. in 5*m*. 46*s*.	+ 4.61
Observed P. F. diameter	17.46

	″
Δ N. S. limbs micr. in rev.	0.687 = 13.39
Variation of declination in 5*m*. 46*s*.	+ 1.71
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	12.90

h. m.	″
Δρ at 6 49	0.17
Δρ at 6 55	0.15

h. m.	″
Δρ at 8 2	0.16
Δρ at 8 8	0.15

JANUARY 9, 1852.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel	278	40.2	52.8	5.5	18.2	31.0	6 43 5.54	+6.90			28.031	58.7	54.0
2	Mars	S.F.	32.0	45.0	57.6	10.3	23.2	6 46 57.62	3.34	+3 52.08	−3.56			
3	Bessel	278	42.4	55.2	7.6	20.5	33.3	6 49 7.80	6.44			Ther. att. 66°.8		
4	Mars	N.P.	33.0	45.5	58.3	11.0	23.8	6 52 58.32	3.74½	3 50.52	2.69½	Bar. red. to 32° F.		
5	Bessel	278	33.5	46.3	59.0	11.6	24.5	6 54 58.98	6.04			27.928		
6	Mars	S.F.	24.6	37.5	50.3	3.0	15.9	6 58 50.26	2.61	3 51.28	3.43			
7	Bessel	278	46.8	59.5	12.2	24.9	37.6	7 1 12.20	5.67½					
8	Mars	S.F.	37.6	50.5	3.4	15.9	28.5	7 5 3.18	2.39	3 50.98	3.28½			
9	Bessel	278	23.5	36.3	49.0	1.7	14.5	7 7 49.00	5.14					
10	Mars	N.P.	13.2	25.7	38.5	51.2	4.0	7 11 38.52	2.79	3 49.52	2.35			
11	Bessel	278	13.8	26.7	39.3	52.0	4.6	7 14 39.28	4.81					
12	Mars	N.P.	2.8	15.7	28.4	41.0	53.8	7 18 28.34	2.51½	3 49.06	2.29½			
13	Bessel	278	32.1	44.7	57.5	10.0	22.9	7 20 57.44	4.47					
14	Mars	S.F.	22.0	34.5	47.3	0.0	12.8	7 24 47.32	1.53	3 49.88	2.94			
15	Bessel	278	28.2	41.0	53.8	6.3	19.0	7 26 53.66	4.11					
16	Mars	N.P.	16.6	29.2	42.4	54.6	7.5	7 30 42.06	2.04	3 48.40	2.07			
17	Bessel	278	16.5	29.0	42.0	54.5	7.4	7 32 41.88	3.88½					
18	Mars	S.F.	5.5	18.2	31.0	43.7	56.5	7 36 30.98	1.10½	3 49.10	2.78			
19	Bessel	278	3.0	16.0	28.6	41.2	54.0	7 38 28.56	3.63½					
20	Mars	N.P.	50.7	3.5	16.2	28.7	41.3	7 42 16.08	1.72	3 47.52	1.91½			
21	Bessel	278	59.0	11.7	24.3	37.0	49.8	7 44 24.36	5.40					
22	Mars	S.F.	47.5	0.2	13.0	25.4	38.3	7 48 12.88	2.87	3 48.52	2.53			
23	Bessel	278	47.0	0.0	12.6	25.2	38.0	7 50 12.56	5.23					
24	Mars	N.P.	34.0	46.8	59.3	12.0	24.8	7 53 59.38	3.51	3 46.82	1.72			
25	Bessel	278	39.4	51.3	5.0	17.7	30.3	7 56 4.74	5.01					
26	Mars	S.F.	27.3	40.0	52.6	5.0	18.2	7 59 52.62	+2.61½	+3 47.88	−2.39½			

JANUARY 9. 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
27	Bessel . . . 278	16.3	29.0	41.6	54.3	7.2	8 1 41.68	+5.00			27.990	55.3	52.4
28	Mars . . . N.P.	2.6	15.3	28.0	40.5	53.5	8 5 27.98	3.46	+3 46.30	—1.54			
29	Bessel . . . 278	10.3	23.2	36.0	48.5	1.3	8 7 35.86	4.84			Ther. att. 63°.0		
30	Mars . . . S.F.	57.5	10.2	22.8	35.5	48.3	8 11 22.86	2.56	3 47.00	2.28	Bar. red. to 32° F. 27.898		
31	Bessel . . . 278	53.2	6.0	18.8	31.4	44.2	8 15 18.72	4.69					
32	Mars . . . N.P.	38.8	51.5	4.3	16.9	29.7	8 19 4.24	3.35	3 45.52	1.34			
33	Bessel . . . 278	30.6	43.3	56.0	8.6	21.5	8 20 56.00	4.59					
34 *a*	Mars . . . S.F.	17.0	29.6	42.6	55.2	7.8	8 24 42.44	2.47	3 46.44	2.12			
35	Bessel . . . 278	4.8	17.6	30.4	43.0	56.0	8 26 30.36	4.46½					
36	Mars . . . N.P.	49.8	2.5	15.2	27.6	40.4	8 30 15.10	3.33	3 44.74	1.13½			
37	Bessel . . . 278	26.0	38.6	51.4	3.9	16.8	8 31 51.34	4.46½					
38	Mars . . . S.F.	11.5	24.3	37.0	49.8	2.5	8 35 37.02	2.59	3 45.68	1.87½			
39	Bessel . . . 278	. .	54.3	7.0	19.6	32.3	8 37 6.96	4.48½					
40	Mars . . . N.P.	25.6	38.2	51.2	3.7	16.6	8 40 51.06	+3.50	+3 44.10	—0.98½			

Remarks.

Night very fair, and observations satisfactory, though both objects were wavy in motion.

a Recorded 37.6*s*. at wire C.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Ten transits . . .	7 41 11.72	+ 3 48.884	—2.720 . . .	=0 53.01
Mean N. P.	Ten transits . . .	7 48 34.11	+ 3 47.250	—1.805 . . .	=0 35.18

	h. m. m. s.		h. m. s.
Correction for chronometer at 7 41 . . .	—2 25.50	Santiago sid. time S. F.	7 38 46.22
Correction for chronometer at 7 49 . . .	—2 25.51	Santiago sid. time N. P.	7 46 8.60
		Interval	7 22.38
	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	24.51	Δ N. S. limbs micr. in rev.	0.915 = 17.83
Variation of A. R. in 7*m*. 22*s*.	— 6.10	Variation of declination in 7*m*. 22*s*. . .	— 2.20
Observed P. F. diameter	18.41	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	13.43
h. m.	″	h. m.	″
Δ ρ at 7 37	0.05	Δ ρ at 7 44	0.03

JANUARY 10, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	. .	24.6	. .	. .	6 47 24.58	+3.50			28.003	60.0	55.7
2	Bessel . . . 278	. .	. .	12.0	. .	. .	6 48 11.98	7.95	—47.40	—4.45			
3	Mars . . . N.P.	. .	31.0	43.8	56.8	. .	6 49 43.89	4.32½			Ther. att. 66°.0		
4	Bessel . . . 278	. .	20.3	33.0	45.6	. .	6 50 32.99	7.88	49.10	3.55½	Bar. red. to 32° F. 27.902		
5	Mars . . . S.F.	. .	10.5	23.2	35.8	. .	6 52 23.19	3.33					
6	Bessel . . . 278	. .	58.3	10.8	23.5	. .	6 53 10.89	+7.72	—47.70	—4.39			

JANUARY 10, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
7	Mars . . . N.P.	. .	14.7	27.5	40.2	. .	6 55 27.49	+3.97			28.003	60.0	55.7
8	Bessel . . . 278	. .	4.0	16.8	29.5	. .	6 56 16.79	7.37	—49.30	—3.40			
9	Mars . . . S.F.	. .	44.3	57.2	9.8	. .	6 59 57.12	2.78			Ther. att. 66°.0		
10	Bessel . . . 278	. .	32.5	45.2	58.0	. .	7 0 45.26	7.10	48.14	4.32	Bar. red. to 32° F.		
11	Mars . . . N.P.	. .	33.8	46.5	59.1	. .	7 2 46.49	3.51			27.902		
12	Bessel . . . 278	. .	23.2	36.0	48.8	. .	7 3 36.02	6.88½	49.53	3.37½			
13	Mars . . . S.F.	. .	37.3	50.2	2.5	. .	7 5 50.02	2.50					
14	Bessel . . . 278	. .	25.6	38.2	51.0	. .	7 6 38.29	6.70	48.27	4.20			
15	Mars . . . N.P.	. .	7.0	19.8	32.3	. .	7 8 19.72	3.15					
16	Bessel . . . 278	. .	56.6	9.5	22.3	. .	7 9 9.49	6.55½	49.77	3.40½			
17	Mars . . . S.F.	. .	. .	46.6	. .	. .	7 12 46.58	2.19					
18	Bessel . . . 278	. .	. .	35.5	. .	. .	7 13 35.48	6.35	48.90	4.16			
19	Mars . . . N.P.	. .	. .	53.5	. .	. .	7 14 53.48	2.92					
20	Bessel . . . 278	. .	. .	43.4	. .	. .	7 15 43.38	6.22	49.90	3.30			
21	Mars . . . S.F.	. .	. .	45.4	. .	. .	7 19 45.38	1.86½					
22	Bessel . . . 278	. .	. .	34.6	. .	. .	7 20 34.58	5.89½	49.20	4.03			
23	Mars . . . N.P.	. .	. .	57.8	. .	. .	7 21 57.78	2.64					
24	Bessel . . . 278	. .	. .	48.3	. .	. .	7 22 48.28	5.84	50.50	3.20			
25	Mars . . . S.F.	. .	. .	27.8	. .	. .	7 24 27.78	1.66½					
26	Bessel . . . 278	. .	. .	17.5	. .	. .	7 25 17.48	5.66½	49.70	4.00			
27	Mars . . . S.F.	. .	. .	56.6	. .	. .	7 26 56.58	1.61½					
28	Bessel . . . 278	. .	. .	46.3	. .	. .	7 27 46.28	5.54	49.70	3.92½			
29	Mars . . . N.P.	. .	. .	33.5	. .	. .	7 29 33.48	2.31					
30	Bessel . . . 278	. .	. .	24.3	. .	. .	7 30 24.28	5.41½	50.80	3.10½			
31	Mars . . . N.P.	. .	. .	39.0	. .	. .	7 31 38.98	2.21					
32	Bessel . . . 278	. .	. .	29.7	. .	. .	7 32 29.68	5.30	50.70	3.09			
33	Mars . . . S.F.	. .	. .	46.4	. .	. .	7 34 46.38	1.33					
34	Bessel . . . 278	. .	. .	36.6	. .	. .	7 35 36.58	5.14½	50.20	3.81½			
35	Mars . . . N.P.	. .	. .	19.3	. .	. .	7 37 19.28	2.05					
36	Bessel . . . 278	. .	. .	10.6	. .	. .	7 38 10.58	5.05½	51.30	3.00½			
37	Mars . . . S.F.	. .	. .	39.7	. .	. .	7 39 39.68	1.22½					
38	Bessel . . . 278	. .	. .	30.1	. .	. .	7 40 30.08	4.99	50.40	3.76½			
39	Mars . . . N.P.	. .	. .	15.5	. .	. .	7 42 15.48	1.97½					
40	Bessel . . . 278	. .	. .	7.1	. .	. .	7 43 7.08	4.84	51.60	2.86½			
41	Mars . . . S.F.	. .	. .	19.2	. .	. .	7 45 19.18	1.05					
42	Bessel . . . 278	. .	. .	10.0	. .	. .	7 46 9.98	4.74	50.80	3.69			
43	Mars . . . N.P.	. .	. .	24.3	. .	. .	7 47 24.28	1.81					
44	Bessel . . . 278	. .	. .	16.3	. .	. .	7 48 16.28	4.64	52.00	2.83			
45	Mars . . . S.F.	. .	. .	40.5	. .	. .	7 49 40.48	0.95½					
46	Bessel . . . 278	. .	. .	31.7	. .	. .	7 50 31.68	4.54	51.20	3.58½			
47	Mars . . . N.P.	. .	. .	54.0	. .	. .	7 51 53.98	1.76					
48	Bessel . . . 278	. .	. .	46.2	. .	. .	7 52 46.18	4.50	52.20	2.74			
49	Mars . . . S.F.	. .	. .	21.7	. .	. .	7 54 21.68	0.84					
50	Bessel . . . 278	. .	. .	13.0	. .	. .	7 55 12.98	4.37	51.30	3.53			
51	Mars . . . N.P.	. .	. .	38.7	. .	. .	7 56 38.68	1.67					
52	Bessel . . . 278	. .	. .	31.5	. .	. .	7 57 31.48	+4.27	—52.80	—2.60			

JANUARY 10, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
53	Mars . . . S.F.	. .	. .	34.8	. .	. .	8 0 34.78	+0.77			27.984	60.0	54.0
54	Bessel . . . 278	. .	. .	26.7	. .	. .	8 1 26.68	4.18	—51.90	—3.41			
55	Mars . . . N.P.	. .	. .	25.9	. .	. .	8 3 25.88	1.59			Ther. att. 65°0		
56	Bessel . . . 278	. .	. .	19.0	. .	. .	8 4 18.98	4.10	53.10	2.51	Bar. red. to 32° F.		
57	Mars . . . S.F.	. .	. .	30.5	. .	. .	8 5 30.48	0.73			27.886		
58	Bessel . . . 278	. .	. .	22.6	. .	. .	8 6 22.58	4.09	52.10	3.36			
59	Mars . . . N.P.	. .	. .	35.7	. .	. .	8 7 35.68	1.51½					
60	Bessel . . . 278	. .	. .	29.0	. .	. .	8 8 28.98	4.02	53.30	2.50½			
61	Mars . . . S.F.	. .	. .	17.5	. .	. .	8 10 17.48	0.68½					
62	Bessel . . . 278	. .	. .	9.9	. .	. .	8 11 9.88	3.97½	52.40	3.29			
63	Mars . . . N.P.	. .	. .	20.0	. .	. .	8 12 19.98	1.52					
64	Bessel . . . 278	. .	. .	13.5	. .	. .	8 13 13.48	3.92½	53.50	2.40½			
65	Mars . . . S.F.	. .	. .	34.5	. .	. .	8 14 34.48	0.66					
66	Bessel . . . 278	. .	. .	27.0	. .	. .	8 15 26.98	3.87	52.50	3.21			
67	Mars . . . N.P.	. .	. .	46.2	. .	. .	8 16 46.18	1.51					
68	Bessel . . . 278	. .	. .	40.2	. .	. .	8 17 40.18	3.83	54.00	2.32			
69	Mars . . . S F.	. .	. .	52.1	. .	. .	8 18 52.08	0.67½					
70	Bessel . . . 278	. .	. .	45.0	. .	. .	8 19 44.98	3.80½	52.90	3.13			
71	Mars . . . N.P.	. .	. .	26.0	. .	. .	8 21 25.98	1.54					
72	Bessel . . . 278	. .	. .	20.0	. .	. .	8 22 19.98	3.80	54.00	2.26			
73	Mars . . . S.F.	. .	. .	41.7	. .	. .	8 23 41.68	0.69					
74	Bessel . . . 278	. .	. .	35.0	. .	. .	8 24 34.98	3.73	53.30	3.04			
75	Mars . . . N.P.	. .	. .	29.3	. .	. .	8 25 29.28	1.54					
76	Bessel . . . 278	. .	. .	23.6	. .	. .	8 26 23.58	3.76	54.30	2.22			
77	Mars . . . S.F.	. .	. .	28.6	. .	. .	8 27 28.58	0.71					
78	Bessel . . . 278	. .	. .	21.3	. .	. .	8 28 21.28	3.77	52.70	3.06			
79	Mars . . . N.P.	. .	. .	18.6	. .	. .	8 29 18.58	1.60					
80	Bessel . . . 278	. .	. .	13.5	. .	. .	8 30 13.48	3.75	54.90	2.15			
81	Mars . . . S.F.	. .	. .	30.6	. .	. .	8 31 30.58	0.71½					
82	Bessel . . . 278	. .	. .	24.2	. .	. .	8 32 24.18	3.63	53.60	2.91½			
83	Mars . . . N.P.	. .	. .	22.0	. .	. .	8 33 21.98	1.50					
84	Bessel . . . 278	. .	. .	16.8	. .	. .	8 34 16.78	3.59	54.80	2.09			
85	Mars . . . S.F.	. .	. .	18.3	. .	. .	8 35 18.28	0.73					
86	Bessel . . . 278	. .	. .	12.3	. .	. .	8 36 12.28	3.63	54.00	2.90			
87	Mars . . . N.P.	. .	. .	7.3	. .	. .	8 37 7.28	1.61					
88	Bessel . . . 278	. .	. .	2.5	. .	. .	8 38 2.48	3.62	55.20	2.01			
89	Mars . . . S.F.	. .	. .	53.5	. .	. .	8 38 53.48	0.76					
90	Bessel . . . 278	. .	. .	47.6	. .	. .	8 39 47.58	3.66	54.10	2.90			
91	Mars . . . N.P.	. .	. .	35.3	. .	. .	8 40 35.28	1.67½					
92	Bessel . . . 278	. .	. .	30.6	. .	. .	8 41 30.58	+3.65	—55.30	—1.97½			

Remarks.

Until 7*h*. 20*m*. the images were not very well defined, nor their motions steady, but after that time both objects were extremely sharp, and the measures very satisfactory.

JANUARY 10, 1852—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Twenty-three transits .	7 47 49.60	—0 50.974	—3.612 . . .	=1 10.40
Mean N. P. . .	Twenty-three transits .	7 50 19.10	—0 52.256	—2.735 . . .	=0 53.30

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 48 . . .	—2 27.83	Santiago sid. time S. F.	7 45 21.77
Correction for chronometer at	7 50 . . .	—2 27.83	Santiago sid. time N. P.	7 47 51.27
			Interval	2 29.50

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	19.23	Δ N. S. limbs mic. in rev. 0.877	=17.09
Variation of A. R. in 2*m*. 30*s*.	— 2.13	Variation of declination in 2*m*. 30*s*. . .	— 0.75
Observed P. F. diameter	17.10	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	14.14

h. m.	″	h. m.	″
Δ ρ at 7 46	0.06	Δ ρ at 7 48	0.05

JANUARY 11, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	278	. .	53.2	5.7	18.5	31.4	7 59 5.85	+4.36½			28.093	56.3	52.0
2	Mars . . .	S.F.	6.0	18.8	31.3	44.0	56.8	8 1 31.38	3.79	+2 25.53	—0.57½			
3	Bessel . . .	278	16.8	30.0	42.5	55.2	8.2	8 3 42.54	4.12½			Ther. att. 64°.2		
4	Mars . . .	N.P.	41.5	54.0	6.8	19.5	32.3	8 6 6.82	4.50	2 24.28	+0.37½	Bar. red. to 32° F.		
5	Bessel . . .	278	43.5	56.4	9.3	21.7	34.5	8 8 9.08	4.04			27.997		
6	Mars . . .	S.F.	8.5	21.4	34.2	46.8	59.7	8 10 34.12	3.63	2 25.04	—0.41			
7	Bessel . . .	278	50.5	3.4	16.0	28.8	41.6	8 12 16.06	4.01½					
8	Mars . . .	N.P.	14.2	27.0	39.6	52.4	5.0	8 14 39.64	4.50½	2 23.58	+0.49			
9	Bessel . . .	278	59.3	11.8	24.7	37.5	50.3	8 16 24.72	3.96					
10	Mars . . .	S.F.	23.8	36.5	49.0	1.7	14.8	8 18 49.16	3.62½	2 24.44	—0.33½			
11	Bessel . . .	278	5.5	18.8	31.3	44.0	57.0	8 20 31.32	3.90½					
12	Mars . . .	N.P.	28.7	41.5	54.4	7.0	19.8	8 22 54.28	4.58	2 22.96	+0.67½			
13	Bessel . . .	278	19.6	32.4	45.3	58.0	10.8	8 24 45.22	3.93					
14	Mars . . .	S.F.	43.5	56.5	9.0	21.6	34.7	8 27 9.06	3.80	2 23.84	—0.13			
15	Bessel . . .	278	23.4	36.0	48.8	0.7	14.5	8 28 48.68	3.92					
16	Mars . . .	N.P.	45.8	58.5	11.4	24.0	36.8	8 31 11.30	4.70	3 22.62	+0.78	28.068	55.2	52.5
17	Bessel . . .	278	29.8	42.5	55.3	8.0	20.8	8 32 55.28	3.94			Ther. att. 63°.0		
18	Mars . . .	S.F.	53.2	. .	18.0	30.8	44.3	8 35 18.40	3.96½	2 23.12	+0.02½	Bar. red. to 32° F.		
19	Bessel . . .	278	32.0	44.6	. .	10.2	23.0	8 36 57.46	3.98½			27.976		
20	Mars . . .	N.P.	54.0	6.8	19.5	32.3	45.0	8 39 19.52	+4.86	+2 22.06	+0.87½			

Remarks.

Early part of the night cloudy; after it cleared away, the measures were very fair.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Five transits	8 18 40.42	+2 24.394	—0.285	0 5.55
Mean N. P. . .	Five transits	8 22 50.31	+2 23.100	+0.639	0 12.45

	h. m.	m. s.		h. m. s.
Correction for chronometer at	8 19 . . .	—2 29.34	Santiago sid. time S. F.	8 16 11.08
Correction for chronometer at	8 23 . . .	—2 29.35	Santiago sid. time N. P.	8 20 20.96
			Interval	4 9.88

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	19.41	Δ N. S. limbs micr. in rev. 0.924	=18.01
Variation of A. R. in 4*m*. 10*s*.	— 3.66	Variation of declination in 4*m*. 10*s*. . .	— 1.26
Observed P. F. diameter	15.75	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	14.55

h. m.	″	h. m.	″
Δ ρ at 8 15	0.00	Δ ρ at 8 19	0.01

JANUARY 12, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	278	. .	2.8	15.5	28.2	. .	6 46 15.50	+3.31½			28.013	54.0	50.0
2	Mars . . .	S.F.	. .	14.3	26.8	39.7	. .	6 47 26.93	3.97	+1 11.43	+0.65½			
3	Bessel . . .	278	. .	7.0	19.6	32.5	. .	6 49 19.70	3.05			Ther. att. 63°.2 Bar. red. to 32° F. 27.920		
4	Mars . . .	N.P.	. .	17.0	29.5	42.2	. .	6 50 29.57	4.68	1 9.87	1.63			
5	Bessel . . .	278	. .	35.5	48.2	1.0	. .	6 52 48.23	2.90					
6 a	Mars . . .	S.F.	. .	46.3	59.0	12.7	. .	6 53 59.33	3.62	1 11.10	0.72			
7	Bessel . . .	278	. .	22.4	35.0	47.7	. .	6 55 35.03	2.63					
8	Mars . . .	N.P.	. .	32.0	44.5	57.0	. .	6 56 44.50	4.31	1 9.47	1.68			
9	Bessel . . .	278	. .	46.0	58.8	11.5	. .	6 58 58.77	2.40					
10	Mars . . .	S.F.	. .	56.6	9.3	22.0	. .	7 0 9.30	3.25	1 10.53	0.85			
11	Bessel . . .	278	. .	21.5	34.0	46.8	. .	7 4 34.10	1.80					
12	Mars . . .	N.P.	. .	30.4	43.0	55.5	. .	7 5 42.97	3.65	1 8.87	1.85			
13	Bessel . . .	278	. .	10.2	23.0	35.6	. .	7 7 22.93	1.62½					
14	Mars . . .	S.F.	. .	20.3	33.0	45.5	. .	7 8 32.93	2.58	1 10.00	0.95½			
15	Bessel . . .	278	. .	11.7	24.4	37.2	. .	7 10 24.43	1.48					
16	Mars . . .	N.P.	. .	20.4	33.1	45.6	. .	7 11 33.03	3.39	1 8.60	1.91			
17	Bessel . . .	278	. .	9.3	22.0	34.8	. .	7 13 22.03	1.39					
18	Mars . . .	S.F.	. .	18.8	31.5	44.2	. .	7 14 31.50	2.40	1 9.47	1.01			
19	Bessel . . .	278	. .	5.6	18.2	31.0	. .	7 16 18.27	1.06					
20	Mars . . .	N.P.	. .	13.5	26.3	39.0	. .	7 17 26.27	3.15	1 8.00	2.09			
21	Bessel . . .	278	. .	3.5	16.3	28.5	. .	7 19 16.10	0.97					
22	Mars . . .	S.F.	. .	12.5	25.4	38.0	. .	7 20 25.30	2.20½	1 9.20	1.23½			
23	Bessel . . .	278	. .	32.0	44.8	57.4	. .	7 22 44.73	0.78					
24	Mars . . .	N.P.	. .	40.1	52.6	5.3	. .	7 23 52.67	2.86	1 7.94	2.08			
25	Bessel . . .	278	. .	37.4	50.1	2.6	. .	7 25 50.03	0.63½					
26	Mars . . .	S.F.	. .	46.2	58.8	11.5	. .	7 26 58.83	1.95	1 8.80	1.31½			
27	Bessel . . .	278	. .	32.3	45.0	57.8	. .	7 28 45.03	0.52					
28	Mars . . .	N.P.	. .	39.8	52.3	5.1	. .	7 29 52.40	2.73	1 7.37	2.21			
29	Bessel . . .	278	. .	19.3	31.7	44.5	. .	7 31 31.83	1.83½					
30	Mars . . .	S.F.	. .	27.4	40.1	52.6	. .	7 32 40.03	3.31	1 8.20	1.47½			
31	Bessel . . .	278	. .	39.3	52.0	4.6	. .	7 35 51.97	1.69					
32	Mars . . .	N.P.	. .	46.2	58.8	11.5	. .	7 36 58.83	3.99	1 6.86	2.30			
33	Bessel . . .	278	. .	53.1	5.7	18.5	. .	7 39 5.77	1.52					
34	Mars . . .	S.F.	. .	1.0	13.6	26.2	. .	7 40 13.60	2.97½	1 7.83	1.45½			
35	Bessel . . .	278	. .	36.9	49.5	2.2	. .	7 41 49.53	1.38					
36	Mars . . .	N.P.	. .	43.4	56.0	8.6	. .	7 42 56.00	3.81	1 6.47	2.43			
37 b	Bessel . . .	278	. .	2.0	14.8	27.4	. .	7 44 14.73	1.32					
38	Mars . . .	S.F.	. .	9.5	22.3	34.5	. .	7 45 22.10	2.89	1 7.37	1.57			
39	Bessel . . .	278	. .	46.5	59.3	12.0	. .	7 46 59.27	1.20					
40	Mars . . .	N.P.	. .	52.6	5.4	18.1	. .	7 48 5.37	3.69	1 6.10	2.49			
41	Bessel . . .	278	. .	32.6	45.3	58.0	. .	7 49 45.30	1.12½					
42	Mars . . .	S.F.	. .	39.9	52.5	5.1	. .	7 50 52.50	2.76½	1 7.20	1.64			
43 c	Bessel . . .	278	. .	43.6	56.4	9.0	. .	7 53 56.33	1.00					
44	Mars . . .	N.P.	. .	49.5	2.2	15.0	. .	7 55 2.23	3.60	1 5.90	2.60			
45 c	Bessel . . .	278	. .	6.0	18.8	31.5	. .	7 56 18.77	0.93					
46	Mars . . .	S.F.	. .	12.5	25.5	38.3	. .	7 57 25.43	+2.73	+1 6.66	+1 80			

JANUARY 12, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47 c	Bessel . . .	278	. .	37.6	50.3	3.0	. .	7 58 50.30	+0.94			27.980	54.0	48.5
48 d	Mars . . .	N.P.	. .	43.2	55.6	8.5	. .	7 59 55.77	3.55½	+1 5.47	+2.61½			
49 e	Bessel . . .	278	. .	42.0	55.0	7.6	. .	8 19 54.87	1.93			Ther. att. 63°.5 Bar. red. to 32° F. 27.886		
50	Mars . . .	S.F.	. .	47.3	0.0	12.8	. .	8 21 0.03	4.13½	1 5.16	2.20½			
51	Bessel . . .	278	. .	16.3	29.0	41.7	. .	8 22 29.00	1.88½					
52	Mars . . .	S.F.	. .	21.0	33.8	46.3	. .	8 23 33.70	4.11½	1 4.70	2.23			
53	Bessel . . .	278	. .	1.3	14.0	26.8	. .	8 25 14.03	1.95					
54	Mars . . .	N.P.	. .	5.2	18.0	30.5	. .	8 26 17.90	5.00	1 3.87	3.05			
55	Bessel . . .	278	. .	6.0	18.8	31.4	. .	8 28 18.73	1.91					
56	Mars . . .	N.P.	. .	9.5	22.3	35.0	. .	8 29 22.27	5.02	1 3.54	3.11			
57	Bessel . . .	278	. .	34.5	47.2	59.8	. .	8 30 47.17	1.95					
58	Mars . . .	S.F.	. .	38.8	51.5	4.3	. .	8 31 51.53	4.26	1 4.36	2.31			
59	Bessel . . .	278	. .	53.5	6.2	19.0	. .	8 32 6.23	1.90					
60	Mars . . .	N.P.	. .	56.7	9.5	22.2	. .	8 33 9.47	+5.14	+1 3.24	+3.24			

Remarks.

Objects blurred, dim and unsteady, and the measures not very satisfactory until towards the close of the observations.

a Recorded 54*m*. at wire C.
b Steady, though blurred.
c Just visible through clouds.
d Observations interrupted by clouds.
e All the rest sharp and steady.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	First twelve transits . .	7 23 13.15	+1 8.982 . . .	+1.223 . . .	=0 23.84
Mean N. P. . .	First twelve transits . .	7 26 33.30	1 7.577 . . .	2.157 . . .	0 42.04
Mean S. F. . .	Last three transits . .	8 25 28.42	1 4.740 . . .	2.248 . . .	0 43.81
Mean N. P. . .	Last three transits . .	8 29 36.55	+1 3.550 . . .	+3.133 . . .	=1 1.06

Correction for chronometer at (h. m.) 7 23 . . .	(m. s.) —2 32.11	Santiago sid. time S. F.	(h. m. s.) 7 20 41.04
Correction for chronometer at 7 27 . . .	—2 32.11	Santiago sid. time N. P.	7 24 1.19
		Interval	3 20.15

Δ P. F. limbs in A. R. reduced to arc . .	21.07″	Δ N. S. limbs micr. in rev. . . .	0.934 = 18.20″
Variation of A. R. in 3*m*. 20*s*.	— 3.00	Variation of declination in 3*m*. 20*s*. . .	— 1.00
Observed P. F. diameter	18.07	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	15.00

Correction for chronometer at (h. m.) 8 25 . . .	(m. s.) —2 32.22	Santiago sid. time S. F.	(h. m. s.) 8 22 56.20
Correction for chronometer at 8 29 . . .	—2 32.22	Santiago sid. time N. P.	8 27 4.33
		Interval	4 8.13

Δ P. F. limbs in A. R. reduced to arc . . .	17.85″	Δ N. S. limbs micr. in rev.	0.885 = 17.25″
Variation of A. R. in 4*m*. 8*s*.	— 3.73	Variation of declination in 4*m*. 8*s*. . .	— 1.25
Observed P. F. diameter	14.12	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	13.80

h. m.	″	h. m.	″
Δ ρ at 7 20	0.02	Δ ρ at 8 22	0.04
Δ ρ at 7 23	0.04	Δ ρ at 8 26	0.05

JANUARY 13, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	278	. .	15.2	27.5	40.5	. .	7 29 27.73	+4.36			28.150	51.0	48.8
2	Mars . . .	S.F.	. .	23.8	36.5	49.3	. .	7 30 36.53	4.95	+1 8.80	+0.59			
3	Bessel . . .	278	. .	1.3	14.0	26.7	. .	7 32 14.00	4.31			Ther. att. 59°.7		
4	Mars . . .	N.P.	. .	9.0	21.7	34.3	. .	7 33 21.67	5.81	1 7.67	1.50	Bar. red. to 32° F.		
5	Bessel . . .	278	. .	33.5	46.1	58.8	. .	7 34 46.13	4.22½			28.068		
6	Mars . . .	S.F.	. .	42.0	54.5	7.1	. .	7 35 54.53	4.90½	1 8.40	0.68			
7	Bessel . . .	278	. .	5.5	18.1	30.8	. .	7 38 18.13	4.11					
8	Mars . . .	N.P.	. .	12.6	25.3	38.0	. .	7 39 25.30	5.72½	1 7.17	1.61½			
9 *a*	Bessel . . .	278	. .	7.0	20.0	32.5	. .	7 41 19.83	3.93					
10	Mars . . .	S.F.	. .	15.2	28.0	40.5	. .	7 42 27.90	4.87½	1 8.07	0.94½			
11	Bessel . . .	278	. .	46.8	59.5	12.0	. .	7 43 59.43	3.93					
12 *b*	Mars . . .	N.P.	. .	53.3	6.0	18.5	. .	7 45 5.93	5.58	1 6.50	1.65			
13	Bessel . . .	278	. .	12.0	24.5	37.0	. .	7 47 24.50	3.80					
14	Mars . . .	S.F.	. .	19.8	32.5	45.0	. .	7 48 32.43	4.69	1 7.93	0.89			
15	Bessel . . .	278	. .	8.8	21.6	34.0	. .	7 50 21.47	3.73					
16 *c*	Mars . . .	N.P.	. .	15.0	27.8	40.5	. .	7 51 27.77	5.55	1 6.30	1.82			
17	Bessel . . .	278	. .	15.7	28.3	41.2	. .	7 53 28.40	3.66½					
18 *d*	Mars . . .	S.F.	. .	23.0	35.6	48.3	. .	7 54 35.63	4.62	1 7.23	0.95½			
19	Bessel . . .	278	. .	54.2	6.9	19.5	. .	7 56 6.87	3.59					
20	Mars . . .	N.P.	. .	0.0	12.8	25.4	. .	7 57 12.73	5.54½	1 5.86	1.95½			
21	Bessel . . .	278	. .	1.8	14.5	27.3	. .	8 1 14.53	3.33½					
22	Mars . . .	S.F.	. .	8.5	21.2	34.0	. .	8 2 21.23	4.54	1 6.70	1.20½			
23	Bessel . . .	278	. .	9.5	22.3	35.0	. .	8 4 22.27	3.31					
24	Mars . . .	N.P.	. .	14.6	27.4	40.3	. .	8 5 27.43	5.29	1 5.16	1.98			
25	Bessel . . .	278	. .	21.5	34.2	47.0	. .	8 6 34.23	3.25					
26	Mars . . .	S.F.	. .	28.0	40.6	53.3	. .	8 7 40.63	4.51	1 6.40	1.26			
27	Bessel . . .	278	. .	41.7	54.5	7.2	. .	8 8 54.47	3.19½					
28	Mars . . .	N.P.	. .	46.8	59.5	12.2	. .	8 9 59.50	5.37	1 5.03	2.17½			
29	Bessel . . .	278	. .	11.5	24.3	37.0	. .	8 11 24.27	3.22½					
30	Mars . . .	S.F.	. .	17.5	30.4	43.0	. .	8 12 30.30	4.52	1 6.03	1.29½			
31	Bessel . . .	278	. .	34.6	47.5	0.3	. .	8 13 47.47	3.20					
32	Mars . . .	N.P.	. .	39.6	52.3	5.0	. .	8 14 52.30	5.39	1 4.83	2.19			
33	Bessel . . .	278	. .	58.3	11.0	23.8	. .	8 16 11.03	3.19					
34	Mars . . .	S.F.	. .	4.0	16.8	29.5	. .	8 17 16.77	4.66	1 5.74	1.47			
35	Bessel . . .	278	. .	16.4	29.0	41.8	. .	8 18 29.07	3.20					
36	Mars . . .	N.P.	. .	20.8	33.4	46.0	. .	8 19 33.40	5.48	1 4.33	2.28			
37	Bessel . . .	278	. .	22.0	34.8	47.5	. .	8 25 34.77	3.00					
38 *e*	Mars . . .	S.F.	. .	27.0	39.8	52.5	. .	8 26 39.77	4.56	1 5.00	1.56			
39	Bessel . . .	278	. .	35.5	48.3	1.0	. .	8 27 48.27	3.03					
40	Mars . . .	N.P.	. .	39.3	52.1	4.7	. .	8 28 52.03	5.38½	1 3.76	2.35½			
41 *f*	Bessel . . .	278	. .	58.0	10.8	23.5	. .	8 30 10.77	3.04			28.126	51.0	44.4
42	Mars . . .	S.F.	. .	2.6	15.4	28.2	. .	8 31 15.40	4.59	1 4.63	1.55			
43	Bessel . . .	278	. .	10.6	23.3	36.0	. .	8 32 23.30	3.03			Ther. att. 58°.0		
44	Mars . . .	N.P.	. .	14.0	26.8	39.5	. .	8 33 26.77	5.53½	1 3.47	2.50½	Bar. red. to 32° F.		
45	Bessel . . .	278	. .	29.0	41.5	54.4	. .	8 34 41.63	3.07			28.050		
46	Mars . . .	S.F.	. .	33.5	46.0	58.8	. .	8 35 46.10	+4.72	+1 4.47	+1.65			

JANUARY 13, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 278	. .	34.5	47.2	0.0	. .	8 36 47.23	+3.00			28.126	51.0	44.4
48	Mars . . . N.P.	. .	37.8	50.4	3.0	. .	8 37 50.40	+5.59½	+1 3.17	+2.59½			

Remarks.

Images blurred, flashing, and whirling, as if reflected from a basin of agitated mercury.

a Recorded 27.5*s*. at wire D.
b Images worse, if possible.
c The colored portions now distinguishable.
d Tolerably good.
e Good at last.
f Recorded 40.8*s*. at wire C.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Twelve transits	8 3 48.10	+1 6.617	+1.171	0 22.82
Mean N. P.	Twelve transits	8 6 22.94	+1 5.271	+2.052	0 39.99

	m. s.		h. m. s.
Correction for chronometer at 8 h. 4 m.	−2 34.75	Santiago sid. time S. F.	8 1 13.35
Correction for chronometer at 8 h. 6 m.	−2 34.75	Santiago sid. time N. P.	8 3 48.19
		Interval	2 34.84

	″		″
Δ P. F. limbs in A. R. reduced to arc	20.19	Δ N. S. limbs micr. in rev.	0.881 = 17.17
Variation of A. R. in 2*m*. 35*s*.	− 2.39	Variation of declination in 2*m*. 35*s*.	− 0.78
Observed P. F. diameter	17.80	Corr. for diam. of micr. wires	− 2.20
		Observed N. S. diameter	14.19

	″		″
Δ ρ at 8 h. 1 m.	0.02	Δ ρ at 8 h. 3 m.	0.03

JANUARY 14, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 278	. .	. .	46.3	. .	. .	6 57 46.28	+5.15			27.957	59.5	53.7
2	Mars . . . S.F.	. .	. .	10.0	. .	. . .	6 59 9.98	−5.87½	+1 23.70	−11.02½			
3	Bessel . . . 278	. .	. .	35.7	. .	. .	7 2 35.68	+4.30½			Ther. att. 66°.2 Bar. red. to 32° F. 27.855		
4	Mars . . . N.P.	. .	. .	58.5	. .	. .	7 3 58.48	−5.73	1 22.80	10.03½			
5	Bessel . . . 278	. .	. .	3.0	. .	. .	7 6 2.98	+4.11½					
6	Mars . . . S.F.	. .	. .	26.5	. .	. .	7 7 26.48	−6.74½	1 23.50	10.86			
7	Bessel . . . 278	. .	. .	43.6	. .	. .	7 8 43.58	+3.98					
8	Mars . . . N.P.	. .	. .	6.2	. .	. .	7 10 6.18	−5.96½	1 22.60	9.94½			
9	Bessel . . . 278	. .	. .	48.5	. .	. .	7 12 48.48	+3.73					
10	Mars . . . S.F.	. .	. .	11.5	. .	. .	7 14 11.48	−6.94½	1 23.00	10.67½			
11	Bessel . . . 278	. .	. .	48.6	. .	. .	7 15 48.58	+3.71					
12	Mars . . . N.P.	. .	. .	10.1	. .	. .	7 17 10.08	−6.12½	1 21.50	9.83½			
13	Bessel . . . 278	. .	. .	37.6	. .	. .	7 18 37.58	+3.62					
14	Mars . . . S.F.	. .	. .	0.0	. .	. .	7 19 59.98	−7.03	1 22.40	10.65			
15	Bessel . . . 278	. .	. .	19.0	. .	. .	7 21 18.98	+3.44½					
16	Mars . . . N.P.	. .	. .	40.1	. .	. .	7 22 40.08	−6.25½	+1 21.10	−9.70			

JANUARY 14, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
17	Bessel . . . 278	. .	. .	44.9	. .	. .	7 23 44.88	+3.41½			27.957	59.5	53.7
18	Mars . . . S.F.	. .	. .	7.0	. .	. .	7 25 6.98	—7.15½	+1 22.10	—10.57			
19	Bessel . . . 278	. .	. .	13.2	. .	. .	7 26 13.18	+3.31½			Ther. att. 66°.2 Bar. red. to 32° F. 27.855		
20	Mars . . . N.P.	. .	. .	34.0	. .	. .	7 27 33.98	—6.35½	1 20.80	9.67			
21	Bessel . . . 278	. .	. .	6.2	. .	. .	7 29 6.18	+3.17					
22	Mars . . . S.F.	. .	. .	27.9	. .	. .	7 30 27.88	—7.27	1 21.70	10.44			
23	Bessel . . . 278	. .	. .	22.0	. .	. .	7 32 21.98	+3.05					
24	Mars . . . N.P.	. .	. .	42.5	. .	. .	7 33 42.48	—6.47½	1 20.50	9.52½			
25	Bessel . . . 278	. .	. .	50.8	. .	. .	7 34 50.78	+2.93½					
26	Mars . . . S.F.	. .	. .	12.3	. .	. .	7 36 12.28	—7.42	1 21.50	10.35½			
27	Bessel . . . 278	. .	. .	22.0	. .	. .	7 37 21.98	+2.82½					
28	Mars . . . N.P.	. .	. .	42.5	. .	. .	7 38 42.48	—6.67	1 20.50	9.49½			
29	Bessel . . . 278	. .	. .	46.4	. .	. .	7 39 46.38	+2.76					
30	Mars . . . S.F.	. .	. .	7.4	. .	. .	7 41 7.38	—7.52	1 21.00	10.28			
31	Bessel . . . 278	. .	. .	16.5	. .	. .	7 42 16.48	+2.62½					
32	Mars . . . N.P.	. .	. .	36.2	. .	. .	7 43 36.18	—6.77	1 19.70	9.39½			
33	Bessel . . . 278	. .	. .	12.8	. .	. .	7 45 12.78	+2.55					
34	Mars . . . S.F.	. .	. .	33.3	. .	. .	7 46 33.28	—7.65	1 20.50	10.20			
35	Bessel . . . 278	. .	. .	33.5	. .	. .	7 47 33.48	+2.50					
36	Mars . . . N.P.	. .	. .	53.0	. .	. .	7 48 52.98	—6.80½	1 19.50	9.30½			
37	Bessel . . . 278	. .	. .	54.4	. .	. .	7 49 54.38	+2.42					
38	Mars . . . S.F.	. .	. .	14.8	. .	. .	7 51 14.78	—7.68½	1 20.40	10.10½			
39	Bessel . . . 278	. .	. .	23.5	. .	. .	7 52 28.48	+2.39					
40	Mars . . . N.P.	. .	. .	47.5	. .	. .	7 53 47.48	—6.86½	1 19.00	9.25½			
41	Bessel . . . 278	. .	. .	34.8	. .	. .	7 55 34.78	+2.28					
42	Mars . . . S.F.	. .	. .	54.5	. .	. .	7 56 54.48	—7.75	1 19.70	10.03			
43	Bessel . . . 278	. .	. .	15.0	. .	. .	7 58 14.98	+2.24					
44	Mars . . . N.P.	. .	. .	33.8	. .	. .	7 59 33.78	—6.85½	1 18.80	9.09½			
45	Bessel . . . 278	. .	. .	27.3	. .	. .	8 0 27.28	+2.20					
46	Mars . . . S.F.	. .	. .	47.0	. .	. .	8 1 46.98	—7.74	1 19.70	9.94			
47	Bessel . . . 278	. .	. .	48.2	. .	. .	8 2 48.18	+2.12					
48	Mars . . . N.P.	. .	. .	6.6	. .	. .	8 4 6.58	—6.92	1 18.40	9.04			
49	Bessel . . . 278	. .	. .	4.0	. .	. .	8 5 3.98	+2.08					
50	Mars . . . S.F.	. .	. .	23.5	. .	. .	8 6 23.48	—7.82	1 19.50	9.90			
51	Bessel . . . 278	. .	. .	17.1	. .	. .	8 8 17.08	+2.11					
52	Mars . . . N.P.	. .	. .	35.8	. .	. .	8 9 35.78	—6.93	1 18.70	9.04			
53	Bessel . . . 278	. .	. .	37.5	. .	. .	8 10 37.48	+2.00½					
54	Mars . . . S.F.	. .	. .	56.8	. .	. .	8 11 56.78	—7.76	1 19.30	9.76½			
55	Bessel . . . 278	. .	. .	0.3	. .	. .	8 13 0.28	+2.03					
56	Mars . . . N.P.	. .	. .	17.5	. .	. .	8 14 17.48	—6.89	1 17.20	8.92			
57	Bessel . . . 278	. .	. .	26.1	. .	. .	8 15 26.08	+1.95					
58	Mars . . . S.F.	. .	. .	44.6	. .	. .	8 16 44.58	—7.77	1 18.50	9.72			
59	Bessel . . . 278	. .	. .	38.7	. .	. .	8 17 38.68	+1.95					
60	Mars . . . N.P.	. .	. .	56.4	. .	. .	8 18 56.38	—6.86½	1 17.70	8.81½			
61	Bessel . . . 278	. .	. .	10.6	. .	. .	8 20 10.58	+2.00					
62	Mars . . . S.F.	. .	. .	29.4	. .	. .	8 21 29.38	—7.71	+1 18.80	—9.71			

JANUARY 14, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
63	Bessel . . . 278	. .	. .	22.6	. .	. .	8 22 22.58	+1.95			27.870	59.0	50.0
64	Mars . . . N.P.	. .	. .	39.5	. .	. .	8 23 39.48	—6.84	+1 16.90	—8.79			
65	Bessel . . . 278	. .	. .	32.8	. .	. .	8 24 32.78	+1.93			Ther. att. 64°.3		
66	Mars . . . S.F.	. .	. .	51.0	. .	. .	8 25 50.98	—7.65	1 18.20	9.58	Bar. red. to 32° F.		
67	Bessel . . . 278	. .	. .	42.4	. .	. .	8 26 42.38	+1.94			27.774		
68	Mars . . . N.P.	. .	. .	59.2	. .	. .	8 27 59.18	—6.78	1 16.80	8.72			
69	Bessel . . . 278	. .	. .	57.4	. .	. .	8 28 57.38	+1.96½					
70	Mars . . . S.F.	. .	. .	15.2	. .	. .	8 30 15.18	—7.56½	1 17.80	9.53			
71	Bessel . . . 278	. .	. .	19.7	. .	. .	8 31 19.68	+1.96					
72	Mars . . . N.P.	. .	. .	36.4	. .	. .	8 32 36.38	+6.68½	+1 16.70	—8.64½			

Remarks.

A superb night, and satisfactory measures throughout.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Fourteen transits . .	7 47 56.24	+1 20.628	—10.185 . . .	=3 18.51
Mean N. P. . . .	Fourteen transits . .	7 50 36.41	+1 19.400	— 9.290 . . .	=3 1.48

	h. m.	m. s.
Correction for chronometer at	7 48 . . .	—2 37.30
Correction for chronometer at	7 51 . . .	—2 37.30

	h. m. s.
Santiago sid. time S. F.	7 45 18.94
Santiago sid. time N. P.	7 47 59.11
Interval	2 40.17

	″
Δ P. F. limbs in A. R. reduced to arc . . .	18.42
Variation of A. R. in 2*m.* 40*s.*	— 2.52
Observed P. F. diameter	15.90

	″
Δ N. S. limbs micr. in rev.	0.895 = 17.03
Variation of declination in 2*m.* 40*s.* . . .	— 0.80
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	14.44

h. m.	″
Δ ρ at 7 45	0.18
Δ ρ at 7 47	0.16

JANUARY 15, 1852.

There being an error of 1° in the computation for the Ephemeris, the star selected for the night was not found, and therefore there are no differential measures.

JANUARY 16, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 344	8.0	20.5	33.3	46.0	58.8	6 39 33.32	+3.67½			27.988	63.0	57.0
2	Mars . . . S.F.	24.5	37.5	50.4	3.0	15.8	6 41 50.24	2.51	+2 16.92	—1.16½			
3	Bessel . . . 344	26.8	39.5	52.4	5.2	18.0	6 44 52.38	3.30			Ther. att. 67°.9		
4	Mars . . . N.P.	42.3	55.2	7.8	20.7	33.5	6 47 7.90	2.99	2 15.52	0.31	Bar. red. to 32° F.		
5	Bessel . . . 344	44.5	57.1	9.9	22.5	35.5	6 49 9.90	2.95½			27.882		
6	Mars . . S.F.	0.5	13.5	26.3	39.0	51.8	6 51 26.22	+2.06½	+2 16.32	—0.89			

JANUARY 16, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
7	Bessel . .	344	16.8	29.8	42.5	55.2	8.0	6 55 42.46	+2.58			27.988	63.0	57.0
8	Mars . . .	N.P.	31.5	44.5	57.0	9.6	22.5	6 57 57.02	2.52	+2 14.50	—0.06			
9	Bessel . . .	344	30.2	43.0	55.7	8.5	21.3	6 59 55.74	2.35½			Ther. att. 67°.9 Bar. red. to 32° F. 27.882		
10	Mars . . .	S.F.	45.5	58.5	11.2	24.0	36.8	7 2 11.20	1.55	2 15.46	0.80½			
11	Bessel . . .	344	59.0	11.8	24.6	37.5	50.4	7 4 24.66	2.10½					
12	Mars . . .	N.P.	13.2	26.0	38.8	51.4	4.2	7 6 38.72	2.18	2 14.06	+0.07½			
13	Bessel . . .	344	14.5	27.3	40.0	52.8	5.6	7 8 40.04	1.97					
14	Mars . . .	S.F.	29.8	42.6	55.3	7.8	20.8	7 10 55.26	1.34	2 15.22	—0.63			
15	Bessel . . .	344	28.2	41.6	54.0	6.5	19.5	7 13 53.96	1.74					
16	Mars . . .	N.P.	42.0	54.6	7.5	20.3	33.0	7 16 7.48	1.97	2 13.52	+0.23			
17	Bessel . . .	344	32.6	45.5	58.3	11.0	23.7	7 17 58.22	1.56½					
18	Mars . . .	S.F.	47.0	59.8	12.5	25.3	38.3	7 20 12.58	0.99	2 14.36	—0.57½			
19	Bessel . . .	344	45.4	58.0	10.7	23.6	36.5	7 22 10.84	1.42					
20	Mars . . .	N.P.	58.0	10.8	23.8	36.5	49.3	7 24 23.68	1.76	2 12.34	+0.34			
21 *a*	Bessel . . .	344	21.5	34.5	47.3	0.0	12.8	7 26 47.22	3.51					
22	Mars . . .	S.F.	35.3	48.0	0.8	13.5	26.5	7 29 0.82	3.13½	2 13.60	—0.37½			
23	Bessel . . .	344	44.2	57.0	9.8	22.5	35.3	7 31 9.76	3.32½					
24	Mars . . .	N.P.	56.3	9.2	21.9	34.6	47.3	7 33 21.86	3.81½	2 12.10	+0.49			
25	Bessel . . .	344	50.8	3.5	16.3	29.0	42.0	7 35 16.32	3.18½					
26	Mars . . .	S.F.	4.5	16.3	29.3	42.0	55.0	7 37 29.42	2.89	2 13.10	—0.29½			
27	Bessel . . .	344	29.0	41.7	54.5	7.3	20.2	7 39 54.54	3.24					
28	Mars . . .	N.P.	40.5	53.5	6.3	19.0	31.7	7 42 6.20	3.90	2 11.66	+0.66			
29	Bessel . . .	344	37.0	49.8	2.5	15.3	28.1	7 44 2.54	3.15½					
30	Mars . . .	S.F.	49.5	2.3	15.3	28.0	40.8	7 46 15.18	2.98	2 12.64	—0.17½			
31	Bessel . . .	344	38.5	51.3	4.2	17.0	29.8	7 48 4.16	3.03					
32	Mars . . .	N.P.	49.5	2.4	15.3	27.9	40.6	7 50 15.14	3.83	2 10.98	+0.80			
33	Bessel . . .	344	41.0	53.7	6.5	19.3	32.0	7 52 6.50	2.94					
34	Mars . . .	S.F.	52.6	5.4	18.3	31.0	44.0	7 54 18.26	2.97	2 11.76	0.03			
35	Bessel . . .	344	56.8	9.5	22.3	35.0	48.0	7 56 22.32	2.86					
36	Mars . . .	N.P.	7.4	20.3	33.0	45.6	58.5	7 58 32.96	3.78½	2 10.64	0.92½			
37	Bessel . . .	344	56.3	9.2	22.0	34.6	47.5	8 0 21.92	2.80					
38	Mars . . .	S.F.	7.5	20.5	33.3	46.3	58.8	8 2 33.28	2.97	2 11.36	0.17			
39	Bessel . . .	344	42.5	55.0	8.2	21.0	33.8	8 8 8.10	4.11					
40	Mars . . .	N.P.	52.3	5.2	17.8	30.5	43.4	8 10 17.84	5.14½	2 9.74	1.03½			
41	Bessel . . .	344	45.8	58.5	11.4	24.9	37.0	8 12 11.34	4.06					
42	Mars . . .	S.F.	56.4	9.2	22.0	34.6	47.5	8 14 21.94	4.25	2 10.60	0.19			
43	Bessel . . .	344	53.0	5.5	18.5	31.2	44.0	8 17 18.44	4.07					
44	Mars . . .	N.P.	2.0	14.8	27.6	40.4	53.1	8 19 27.58	5.28½	2 9.14	1.21½			
45	Bessel . . .	344	42.5	55.4	8.0	21.0	33.8	8 21 8.14	4.11			27.962	59.5	54.7
46	Mars . . .	S.F.	52.5	5.3	18.0	30.8	43.5	8 23 18.02	4.55	2 9.88	0.44	Ther. att. 66°.2 Bar. red. to 32° F. 27.860		
47	Bessel . . .	344	19.0	31.9	44.8	57.5	10.4	8 24 44.72	4.10					
48	Mars . . .	N.P.	27.6	40.4	53.3	6.0	18.8	8 26 53.22	+5.41	+2 8.50	+1.31			

Remarks.

There was some indistinctness of definition and tremor in the motion of the objects at the commencement, which became less and less at each succeeding observation.

a Sharp and steady.

JANUARY 16, 1852—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Twelve transits . .	7 32 49.37	+2 13.435	−0.340 . . .	= 0 6.63
Mean N. P. . . .	Twelve transits . .	7 37 45.80	+2 11.938	+0.559 . . .	= 0 10.89

h. m.	m. s.		h. m. s.
Correction for chronometer at 7 33 . . .	−2 43.97	Santiago sid. time S. F.	7 30 5.40
Correction for chronometer at 7 38 . . .	−2 43.98	Santiago sid. time N. P.	7 35 1.82
		Interval	4 56.42
	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	22.45	Δ N. S. limbs micr. in rev.	0.899 = 17.52
Variation of A. R. in 4*m*. 56*s*.	+ 4.91	Variation of declination in 4*m*. 56*s*. . .	− 1.48
Observed P. F. diameter	17.54	Corr. for diameter of micr. wires . .	− 2.20
		Observed N. S. diameter	13.84
h. m.	″	h. m.	″
Δ ρ at 7 29	0.01	Δ ρ at 7 34	0.01

JANUARY 17, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	6.0	18.7	31.4	44.3	57.4	6 35 31.56	+3.93			27.940	64.2	58.2
2	H. C. . . . 17513	34.0	47.0	59.8	12.5	25.3	6 39 59.72	4.64	−4 28.16	−0.71			
3	Mars . . . N.P.	35.0	47.8	0.5	13.3	26.2	6 42 0.56	3.93½			Ther. att. 68°.8 Bar. red. to 32° F. 27.831		
4	H. C. . . . 17513	4.3	17.5	30.0	42.8	55.5	6 46 30.02	3.69½	4 29.46	+0.24			
5	Mars . . . S.F.	14.2	27.0	39.8	52.5	5.5	6 48 39.80	2.66½					
6	H. C. . . . 17513	42.8	55.7	8.5	21.4	34.3	6 53 8.54	3.22½	4 28.74	−0.56			
7	Mars . . . N.P.	38.0	50.7	3.5	16.2	29.0	6 55 3.48	3.26					
8	H. C. . . . 17513	8.3	21.2	34.0	46.8	59.5	6 59 33.96	2.81	4 30.48	+0.45			
9	Mars . . . S.F.	13.0	25.8	38.5	51.3	4.3	7 1 38.58	2.20					
10	H. C. . . . 17513	42.5	55.5	8.3	21.0	34.0	7 6 8.26	2.48	4 29.68	−0.28			
11	Mars . . . N.P.	46.5	59.3	12.0	24.7	37.5	7 8 12.00	2.77					
12	H. C. . . . 17513	17.5	30.5	43.4	56.3	9.0	7 12 43.34	2.14	4 31.34	+0.63			
13	Mars . . . S.F.	26.3	39.2	52.0	4.6	17.8	7 14 51.98	1.74					
14	H. C. . . . 17513	56.5	9.5	22.6	35.4	48.3	7 19 22.46	1.84½	4 30.48	−0.10½			
15	Mars . . . N.P.	24.6	37.5	50.4	3.2	16.0	7 21 50.34	2.37					
16	H. C. . . . 17513	. .	10.0	22.6	35.5	48.0	7 26 22.63	1.59	4 32.29	+0.78			
17	Mars . . . S.F.	15.5	28.4	41.3	54.0	6.8	7 28 41.20	1.19½					
18	H. C. . . . 17513	47.3	0.0	13.0	25.5	38.4	7 33 12.84	1.01½	4 31.64	0.18			
19	Mars . . . N.P.	56.5	9.2	22.0	34.7	47.5	7 35 21.98	1.79½					
20	H. C. . . . 17513	29.5	42.3	55.0	7.8	21.0	7 39 55.12	0.85	4 33.14	0.94½			
21	Mars . . . S.F.	52.5	5.8	18.5	81.3	44.3	7 42 18.48	3.66					
22	H. C. . . . 17513	25.5	38.3	51.1	3.8	16.8	7 46 51.06	3.33	4 32.58	0.33			
23	Mars . . . N.P.	15.2	27.9	40.6	53.3	6.0	7 48 40.60	4.38					
24	H. C. . . . 17513	49.2	2.0	14.8	27.5	40.5	7 53 14.80	3.06½	4 34.20	1.31½			
25	Mars . . . S.F.	32.4	45.3	58.0	10.7	23.6	7 54 58.00	3.50					
26	H. C. . . . 17513	5.7	18.6	31.5	44.2	57.0	7 59 31.40	2.96	4 33.40	0.54			
27	Mars . . . N.P.	3.7	16.5	29.4	42.2	55.0	8 1 29.36	4.35½					
28	H. C. . . . 17513	38.6	51.5	4.4	17.3	30.2	8 6 4.40	2.90½	4 35.04	1.45	27.920	61.5	55.0
29	Mars . . . S.F.	42.2	55.0	7.6	20.4	33.5	2 8 7.74	3.53			Ther. att. 66°.7 Bar. red. to 32° F. 27.818		
30	H. C. . . . 17513	16.5	29.5	42.2	54.6	7.6	8 12 42.08	2.77	4 34.34	0.76			
31	Mars . . . N.P.	59.5	12.3	25.0	37.6	50.5	8 14 24.98	4.43					
32	H. C. . . . 17513	35.3	48.0	0.8	13.5	26.5	8 19 0.82	+2.80	−4 35.84	+1.63			

JANUARY 17, 1852—Continued.

Remarks.

Well defined and steady throughout.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . Eight transits . . .	7 21 50.92	—4 31.127 . . .	+ 0.019 . . .	= 0 0.37
Mean N. P. . . Eight transits . . .	7 28 22.91	—4 32.724 . . .	+ 0.930 . . .	= 0 18.12

h. m.	m. s.		h. m. s.
Correction for chronometer at 7 22 . . .	—2 47.41	Santiago sid. time S. F.	7 19 3.51
Correction for chronometer at 7 28 . . .	—2 47.42	Santiago sid. time N. P.	7 25 35.49
		Interval	6 31.98
	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	23.95	Δ N. S. limbs micr. in rev.	0.911 = 17.75
Variation of A. R. in 6*m.* 32*s.*	— 6.51	Variation of declination in 6*m.* 32*s.* . . .	— 1.92
Observed P. F. diameter	17.44	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	— 13.63
h. m.	″	h. m.	″
Δ ρ at 7 21	0.00	Δ ρ at 7 22	0.02

JANUARY 18, 1852.

There were too many *cirri* constantly obscuring both the planet and star to permit observations with the equatorial, or to allow the comparing star to be seen on the meridian.

JANUARY 19, 1852.

There were too many *cirri* and too much haze to see the comparing star under any light.

JANUARY 20, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . .	344	. .	. .	29.8	. .	. .	6 45 29.78	+2.52			27.953	65.0	58.5
2	Mars . . .	S.F.	. .	. .	29.7	. .	. .	6 46 29.68	—4.47	+59.90	—6.99			
3	Bessel . . .	344	. .	. .	26.8	. .	. .	6 48 26.78	+2.26½			Ther. att. 68°.8		
4	Mars . . .	N.P.	. .	. .	24.6	. .	. .	6 49 24.58	—3.85	57.80	6.11½	Bar. red. to 32° F. 27.844		
5	Bessel . . .	344	. .	. .	26.5	. .	. .	6 50 26.48	+2.16½					
6	Mars . . .	S.F.	. .	. .	25.8	. .	. .	6 51 25.78	—4.72	59.30	6.88½			
7	Bessel . . .	344	. .	. .	39.0	. .	. .	6 52 38.98	+2.07					
8	Mars . . .	N.P.	. .	. .	36.6	. .	. .	6 53 36.58	—3.93½	57.60	6.00½			
9	Bessel . . .	344	. .	. .	41.0	. .	. .	6 54 40.98	+1.93					
10	Mars . . .	S.F.	. .	. .	39.8	. .	. .	6 55 39.78	—4.92½	58.80	6.85½			
11	Bessel . . .	344	. .	. .	51.2	. .	. .	6 56 51.18	+1.84					
12	Mars . . .	N.P.	. .	. .	48.6	. .	. .	6 57 48.58	—4.13	57.40	5.97			
13	Bessel . . .	344	. .	. .	22.9	. .	. .	6 59 22.88	+1.73					
14	Mars . . .	S.F.	. .	. .	21.3	. .	. .	7 0 21.28	—5.04½	58.40	6.77½			
15	Bessel . . .	344	. .	. .	17.0	. .	. .	7 3 16.98	+1.47					
16	Mars . . .	N.P.	. .	. .	13.9	. .	. .	7 4 13.88	—4.36	56.90	5.83			
17	Bessel . . .	344	. .	. .	40.3	. .	. .	7 6 40.28	+1.33½					
18	Mars . . .	S.F.	. .	. .	38.0	. .	. .	7 7 37.98	—5.26½	57.70	6.60			
19 *a*	Bessel . . .	344	. .	. .	31.0	. .	. .	7 9 30.98	+1.30					
20	Mars . . .	N.P.	. .	. .	27.3	. .	. .	7 10 27.28	—4.49½	56.30	5.79½			
21	Bessel . . .	344	. .	. .	30.2	. .	. .	7 13 30.18	+1.08					
22	Mars . . .	S.F.	. .	. .	27.4	. .	. .	7 14 27.38	—5.41	57.20	6.49			
23	Bessel . . .	344	. .	. .	39.4	. .	. .	7 15 39.38	+3.42					
24	Mars . . .	N.P.	. .	. .	35.2	. .	. .	7 16 35.18	—2.27	+55.80	—5.69			

JANUARY 20, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
25	Bessel . . . 344	. .	. .	34.1	. .	. .	7 17 34.08	+3.39			27.953	65.0	58.5
26	Mars . . . S.F.	. .	. .	31.1	. .	. .	7 18 31.08	—3.09	+57.00	—6.48			
27	Bessel . . . 344	. .	. .	21.5	. .	. .	7 19 21.48	+3.33			Ther. att. 68°.8		
28	Mars . . . N.P.	. .	. .	17.2	. .	. .	7 20 17.18	—2.26	55.70	5.59	Bar. red. to 32° F.		
29	Bessel . . . 344	. .	. .	11.6	. .	. .	7 21 11.58	+3.27½			27.844		
30	Mars . . . S.F.	. .	. .	8.4	. .	. .	7 22 8.38	—3.15	56.80	6.42½			
31	Bessel . . . 344	. .	. .	24.6	. .	. .	7 23 24.58	+3.17					
32	Mars . . N.P.	. .	. .	20.1	. .	. .	7 24 20.08	—2.40	55.50	5.57			
33	Bessel . . . 344	. .	. .	37.0	. .	. .	7 25 36.98	+3.06					
34	Mars . . . S.F.	. .	. .	33.5	. .	. .	7 26 33.48	—3.30½	56.50	6.36½			
35	Bessel . . . 344	. .	. .	45.6	. .	. .	7 28 45.58	+2.91					
36	Mars . . . N.P.	. .	. .	41.6	. .	. .	7 29 41.58	—2.56½	56.00	5.47½			
37	Bessel . . . 344	. .	. .	50.9	. .	. .	7 30 50.88	+2.84					
38	Mars . . . S.F.	. .	. .	46.5	. .	. .	7 31 46.48	—3.43	55.60	6.27			
39	Bessel . . . 344	. .	. .	55.1	. .	. .	7 32 55.08	+2.79					
40	Mars . . . N.P.	. .	. .	50.0	. .	. .	7 33 49.98	—2.63½	54.90	5.42½			
41 *b*	Bessel . . . 344	. .	. .	54.5	. .	. .	7 35 54.48	+2.69½					
42	Mars . . . S.F.	. .	. .	50.4	. .	. .	7 36 50.38	—3.54	55.90	6.23½			
43	Bessel . . . 344	. .	. .	51.4	. .	. .	7 37 51.38	+2.62					
44	Mars . . . N.P.	. .	. .	46.0	. .	. .	7 38 45.98	—2.71	54.60	5.33			
45 *c*	Bessel . . . 344	. .	. .	45.0	. .	. .	7 39 44.98	+2.59					
46	Mars . . . S.F.	. .	. .	40.5	. .	. .	7 40 40.48	—3.56	55.50	6.15			
47	Bessel . . . 344	. .	. .	25.6	. .	. .	7 41 25.58	+2.56½					
48	Mars . . . N.P.	. .	. .	20.0	. .	. .	7 42 19.98	—2.72½	54.40	5.29			
49	Bessel . . . 344	. .	. .	15.3	. .	. .	7 43 15.28	+2.51½					
50	Mars . . . S.F.	. .	. .	10.6	. .	. .	7 44 10.58	—3.60	55.30	6.11½			
51	Bessel . . . 344	. .	. .	58.9	. .	. .	7 44 58.88	+2.48½					
52	Mars . . . N.P.	. .	. .	52.6	. .	. .	7 45 52.58	—2.72½	53.70	5.21			
53	Bessel . . . 344	. .	. .	42.4	. .	. .	7 46 42.38	+2.45					
54	Mars . . . S.F.	. .	. .	37.3	. .	. .	7 47 37.28	—3.58	54.90	6.03			
55	Bessel . . . 344	. .	. .	25.3	. .	. .	7 48 25.28	+2.43½					
56	Mars . . . N.P.	. .	. .	18.8	. .	. .	7 49 18.78	—2.73	53.50	5.16½			
57	Bessel . . . 344	. .	. .	12.6	. .	. .	7 50 12.58	+2.39½					
58	Mars . . . S.F.	. .	. .	7.3	. .	. .	7 51 7.28	—3.57	54.70	5.96½			
59	Bessel . . . 344	. .	. .	54.0	. .	. .	7 51 53.98	+2.40					
60	Mars . . . N.P.	. .	. .	47.5	. .	. .	7 52 47.48	—2.76	53.50	5.16			
61	Bessel . . . 344	. .	. .	18.0	. .	. .	7 54 17.98	+2.36					
62	Mars . . . S.F.	. .	. .	12.5	. .	. .	7 55 12.48	—3.58	54.50	5.94			
63	Bessel . . . 344	. .	. .	59.7	. .	. .	7 55 59.68	+2.28½					
64	Mars . . . N.P.	. .	. .	52.6	. .	. .	7 56 52.58	—2.76	52.90	5.04½			
65	Bessel . . . 344	. .	. .	40.5	. .	. .	7 57 40.48	+2.28					
66 *d*	Mars . . . S.F.	. .	. .	34.6	. .	. .	7 58 34.58	—3.66	54.10	5.94			
67	Bessel . . . 344	. .	. .	41.2	. .	. .	7 59 41.18	+2.27					
68	Mars . . . N.P.	. .	. .	34.0	. .	. .	8 0 33.98	—2.84	52.80	5.11			
69	Bessel . . . 344	. .	. .	20.4	. .	. .	8 1 20.38	+2.22					
70	Mars . . . S.F.	. .	. .	14.3	. .	. .	8 2 14.28	—3.63	+53.90	—5.85			

JANUARY 20, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
71	Bessel . . . 344	. .	. .	56.8	. .	. .	8 2 56.78	+2.26			27.953	65.0	58.5
72	Mars . . . N.P.	. .	. .	49.5	. .	. .	8 3 49.48	—2.73½	+52.70	—4.99½			
73	Bessel . . . 344	. .	. .	27.5	. .	. .	8 18 27.48	+2.16			Ther. att. 66°.8		
74	Mars . . . S.F.	. .	. .	19.6	. .	. .	8 19 19.58	—3.34	52.10	5.52	Bar. red. to 32° F. 27.844		
75	Bessel . . . 344	. .	. .	1.0	. .	. .	8 21 0.98	+2.22½					
76	Mars . . . N.P.	. .	. .	52.5	. .	. .	8 22 52.48	—2.50	51.50	4.72½			
77	Bessel . . . 344	. .	. .	42.0	. .	. .	8 22 41.98	+2.20½					
78	Mars . . . S.F.	. .	. .	34.0	. .	. .	8 23 33.98	—3.32	52.00	5.52½			
79	Bessel . . . 344	. .	. .	26.8	. .	. .	8 24 26.78	+2.25					
80	Mars . . . N.P.	. .	. .	17.8	. .	. .	8 25 17.78	—2.41	51.00	4.66			
81	Bessel . . . 344	. .	. .	48.0	. .	. .	8 26 47.98	+2.26					
82	Mars . . . S.F.	. .	. .	40.2	. .	. .	8 27 40.18	—3.20	52.20	5.46			
83	Bessel . . . 344	. .	. .	49.8	. .	. .	8 28 49.78	+2.21					
84	Mars . . . N.P.	. .	. .	40.5	. .	. .	8 29 40.48	—2.35½	50.70	4.56½			
85	Bessel . . . 344	. .	. .	24.2	. .	. .	8 30 24.18	+2.19½					
86	Mars . . . S.F.	. .	. .	15.5	. .	. .	8 31 15.48	—3.19½	51.30	5.39			
87	Bessel . . . 344	. .	. .	6.8	. .	. .	8 32 6.78	+2.26					
88	Mars . . . N.P.	. .	. .	57.5	. .	. .	8 32 57.48	—2.26½	50.70	4.52½			
89	Bessel . . . 344	. .	. .	43.3	. .	. .	8 33 43.28	+2.28½					
90	Mars . . . S.F.	. .	. .	35.0	. .	. .	8 34 34.98	—3.09	51.70	5.37½			
91	Bessel . . . 344	. .	. .	37.0	. .	. .	8 35 36.98	+2.32					
92	Mars . . . N.P.	. .	. .	27.1	. .	. .	8 36 27.08	—2.12½	50.10	4.44½			
93	Bessel . . . 344	. .	. .	51.0	. .	. .	8 37 50.88	+2.35					
94	Mars . . . S.F.	. .	. .	42.3	. .	. .	8 38 42.28	—2.94	51.30	5.29			
95	Bessel . . . 344	. .	. .	51.1	. .	. .	8 39 51.08	+2.46½					
96	Mars . . . N.P.	. .	. .	41.0	. .	. .	8 40 40.98	—1.98½	49.90	4.45			
97	Bessel . . . 344	. .	. .	37.0	. .	. .	8 41 36.98	+2.42½					
98	Mars . . . S.F.	. .	. .	28.0	. .	. .	8 42 27.98	—2.79½	51.00	5.22			
99 *e*	Bessel . . . 344	. .	. .	20.5	. .	. .	8 43 20.48	+2.51½					
100	Mars . . . N.P.	. .	. .	10.0	. .	. .	8 44 9.98	—1.86½	49.50	4.38			
101	Bessel . . . 344	. .	. .	53.6	. .	. .	8 47 53.58	+2.72					
102 *f*	Mars . . . N.P.	. .	. .	43.2	. .	. .	8 48 43.18	—1.61½	49.60	4.33½			
103	Bessel . . . 344	. .	. .	55.2	. .	. .	8 51 55.18	+2.81					
104	Mars . . . N.P.	. .	. .	44.5	. .	. .	8 52 44.48	—1.50½	49.30	4.31½			
105	Bessel . . . 344	. .	. .	53.2	. .	. .	8 53 53.18	+1.02½					
106	Mars . . . S.F.	. .	. .	43.0	. .	. .	8 54 42.98	—4.04½	49.80	5.07			
107	Bessel . . . 344	. .	. .	58.3	. .	. .	8 55 58.28	+1.13½					
108	Mars . . . N.P.	. .	. .	47.0	. .	. .	8 56 46.98	—3.05½	48.70	4.19			
109	Bessel . . . 344	. .	. .	9.3	. .	. .	8 58 9.28	+1.20					
110	Mars . . . S.F.	. .	. .	59.3	. .	. .	8 58 59.28	—3.81	50.00	5.01			
111	Bessel . . . 344	. .	. .	57.6	. .	. .	8 59 57.58	+1.28			27.938	61.0	57.5
112	Mars . . . N.P.	. .	. .	46.4	. .	. .	9 0 46.38	—2.87½	48.80	4.15½			
113	Bessel . . . 344	. .	. .	1.5	. .	. .	9 2 1.48	+1.40½			Ther. att. 68°.2		
114	Mars . . . S.F.	. .	. .	51.2	. .	. .	9 2 51.18	—3.60	49.70	5.00½	Bar. red. to 32° F. 27.830		
115	Bessel . . . 344	. .	. .	53.5	. .	. .	9 3 53.48	+1.41½					
116	Mars . . . N.P.	. .	. .	42.0	. .	. .	9 4 41.98	—2.63½	+48.50	—4.05			

JANUARY 20, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
117	Bessel . . . 344	. .	. .	53.6	. .	. .	9 5 53.58	+1.55½			27.938	61.0	57.5
118	Mars . . . S.F.	. .	. .	43.1	. .	. .	9 6 43.08	—3.46½	+49.50	—5.02			
119	Bessel . . . 344	. .	. .	0.5	. .	. .	9 16 0.48	+2.05					
120	Mars . . . S.F.	. .	. .	49.3	. .	. .	9 16 49.28	—2.71	+48.80	—4.76			

Remarks.

a During all the observations preceding this the planet was flaring in pulsations, as an image in disturbed quicksilver; the measures, however, are tolerably fair.
b Steadier.
c Better.
d Not very steady.
e Sharp and steady.
f All the rest are good.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F.	First eighteen transits	7 27 18.26	+56.444	—6.353	=2 3.82
Mean N. P.	First eighteen transits	7 29 28.65	55.111	5.487	1 46.94
Mean N. P.	Last twelve transits	8 42 59.10	49.858	4.400	1 25.76
Mean S. F.	Last twelve transits	8 44 48.36	+50.783	—5.220	=1 41.73

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 27	—2 55.12	Santiago sid. time S. F.	7 24 23.14
Correction for chronometer at	7 29	—2 55.13	Santiago sid. time N. P.	7 26 33.52
			Interval	2 10.38

	″		″
Δ P. F. limbs in A. R. reduced to arc	20.00	Δ N. S. limb micr. in rev	0.866 = 16.88
Variation of A. R. in 2*m*. 10*s*.	— 2.26	Variation of declination in 2*m*. 10*s*.	— 0.60
Observed P. F. diameter	17.74	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	14.08

	h. m.	m. s.		h. m. s.
Correction for chronometer at	8 43	—2 55.30	Santiago sid. time N. P.	8 40 03.80
Correction for chronometer at	8 45	—2 55.30	Santiago sid. time S. F.	8 41 53.06
			Interval	1 49.26

	″		″
Δ P. F. limbs in A. R. reduced to arc	13.87	Δ N. S. limbs micr. in rev.	0.820 = 15.98
Variation of A. R. in 1*m*. 49*s*.	+ 1.88	Variation of declination in 1*m*. 49*s*.	— 0.52
Observed P. F. diameter	15.75	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.26

	h. m.	″		h. m.	″
Δ ρ at	7 24	0.11	Δ ρ at	8 40	0.08
Δ ρ at	7 26	0.10	Δ ρ at	8 41	0.09

JANUARY 21, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Washington . . .	. .	. .	40.5	. .	. .	6 51 40.48	—3.68½			27.968	59.0	57.5
2	Mars . . . S.F.	0.5	13.0	26.0	38.8	51.8	6 54 26.02	+4.89	+2 45.54	+8.57½			
3	Washington . . .	. .	. .	27.2	. .	. .	6 57 27.18	—3.94			Ther. att. 67°.5		
4	Mars . . . N.P.	. .	58.4	11.3	24.0	. .	7 0 11.23	+5.60½	2 44.05	9.54½	Bar. red. to 32° F. 27.863		
5	Washington . . .	. .	. .	40.5	. .	. .	7 2 40.48	—4.12					
6	Mars . . . S.F.	. .	11.5	24.5	37.3	. .	7 5 24.43	+5.54½	2 43.95	8.66½			
7	Washington . . .	. .	. .	33.5	. .	. .	7 7 33.48	—4.34½					
8	Mars . . . N.P.	. .	4.0	16.6	29.0	. .	7 10 16.53	+5.28	+2 43.05	+9.62½			

JANUARY 21, 1852—Continued.

Remarks.

There is so much haze that the comparing star cannot be seen with any satisfaction; and the planet, though tolerably steady, is badly defined. The observations are, therefore, discontinued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Two transits	6 59 55.22	+2 44.745	+8.620	=2 48.00
Mean N. P.	Two transits	7 5 13.88	+2 43.550	+9.585	=3 6.81

	m. s.
Correction for chronometer at 7h 0m	−2 58.26
Correction for chronometer at 7h 5m	−2 58.27

	h. m. s.
Santiago sid. time S. F.	6 56 56.96
Santiago sid. time N. P.	7 2 15.61
Interval	5 18.65

	″
Δ P. F. limbs in A. R. reduced to arc	17.92
Variation of A. R. in 5*m*. 19*s*.	− 5.54
Observed P. F. diameter	12.38

	″
Δ N. S. limbs micr. in rev.	0.965 = 18.81
Variation of declination in 5*m*. 19*s*.	− 1.51
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	15.10

	″
$\Delta\rho$ at 6h 55m	0.18
$\Delta\rho$ at 7h 1m	0.19

JANUARY 22, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Washington . . .	49.5	2.5	15.5	28.1	41.3	7 9 15.38	+3.04			27.991	61.5	57.2
2	Mars . . . S.F.	22.5	35.3	48.0	0.5	13.8	7 11 48.02	7.15½	+2 32.64	+4.11½			
3	Washington . . .	. .	1.8	14.5	27.3	40.3	7 14 14.56	2.95			Ther. att. 68°.5 Bar. red. to 32° F. 27.883		
4	Mars . . . N.P.	20.3	33.2	46.0	58.5	11.3	7 16 45.86	7.94	2 31.30	4.99			
5	Washington . . .	47.4	0.5	13.3	26.0	38.8	7 19 13.20	2.74					
6	Mars . . . S.F.	19.5	32.4	45.2	58.0	11.0	7 21 45.22	6.92	2 32.02	4.18			
7	Washington . . .	23.2	36.0	48.8	1.5	14.5	7 24 48.80	2.26½					
8	Mars . . . N.P.	. .	6.5	19.3	32.0	45.0	7 27 19.28	7.42½	2 30.48	5.16			
9	Washington . . .	34.3	47.0	0.0	12.8	25.8	7 29 59.98	2.10					
10	Mars . . . S.F.	5.5	18.4	31.2	44.0	57.0	7 32 31.22	6.44½	2 31.24	4.34½			
11	Washington . . .	10.3	23.1	36.0	48.8	1.7	7 34 35.98	1.93½					
12	Mars . . . N.P.	39.8	52.8	5.7	18.5	31.3	7 37 5.62	7.25½	2 29.64	5.32			
13	Washington . . .	. .	0.5	13.2	26.0	39.0	7 39 13.26	1.86½					
14	Mars . . . S.F.	18.0	31.0	43.6	56.4	9.4	7 41 43.68	6.25	2 30.42	4.38½			
15	Washington . . .	15.5	28.3	41.2	54.0	6.8	7 43 41.16	1.76½					
16	Mars . . . N.P.	44.5	57.3	10.3	23.0	35.7	7 46 10.16	7.26½	2 29.00	5.50			
17	Washington . . .	47.5	1.2	13.8	26.5	39.6	7 48 13.72	1.73					
18	Mars . . . S.F.	18.0	31.0	43.7	56.5	9.5	7 50 43.74	6.39	2 30.02	4.66			
19	Washington . . .	27.2	40.0	52.8	5.6	18.5	7 52 52.82	1.66					
20	Mars . . . N.P.	55.5	8.4	21.2	34.0	47.0	7 55 21.22	7.22	2 28.40	5.56			
21	Washington . . .	6.7	19.7	32.5	45.4	58.3	7 58 32.52	1.61					
22	Mars . . . S F.	36.0	49.0	1.8	14.5	27.4	8 1 1.74	6.38	2 29.22	4.77			
23	Washington . . .	31.5	44.4	57.2	10.0	23.0	8 2 57.22	1.57					
24	Mars . . . N.P.	59.2	12.0	24.8	37.6	50.5	8 5 24.82	+7.28	+2 27.60	+5.71			

JANUARY 22, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
25	Washington . . .	53.4	6.2	19.0	31.8	44.6	8 7 19.00	+1.55			27.991	61.5	57.2
26	Mars . . . S.F.	21.6	34.8	47.5	0.3	13.4	8 9 47.52	6.49	+2 28.52	+4.94			
27	Washington . . .	17.5	30.3	43.2	55.8	8.8	8 11 43.12	1.61			Ther. att. 68°.5		
28	Mars . . . N.P.	44.3	57.2	10.0	22.8	35.5	8 14 9.96	7.47	2 26.84	5.86	Bar. red. to 32° F.		
29	Washington . . .	7.4	20.2	33.0	46.0	58.8	8 17 33.08	1.34			27.883		
30 *a*	Mars . . . S.F.	35.0	47.5	0.4	13.5	26.4	8 20 0.56	6.46	2 27.48	5.12			
31	Washington . . .	28.5	41.3	54.3	7.0	20.0	8 21 54.22	1.41					
32 *a*	Mars . . . N.P.	54.6	7.5	20.5	33.4	46.4	8 24 20.48	7.42	2 26.26	6.01			
33	Washington . . .	. .	55.2	8.0	21.0	34.0	8 26 8.13	1.48					
34 *a*	Mars . . . S.F.	9.5	22.5	35.3	48.0	1.0	8 28 35.26	6.63	2 27.13	5.15			
35	Washington . . .	10.5	23.4	36.2	49.0	1.9	8 30 36.20	1.52					
36 *a*	Mars . . . N.P.	36.0	49.0	2.0	14.6	27.5	8 33 1.82	7.63	2 25.62	6.11			
37	Washington . . .	34.3	47.1	0.2	12.7	25.5	8 35 59.96	1.65					
38	Mars . . . S.F.	0.8	13.5	26.5	39.3	52.3	8 38 26.48	6.94	2 26.52	5.29			
39	Washington . . .	16.1	29.0	42.0	54.8	7.5	8 40 41.88	1.74½					
40 *b*	Mars . . . N.P.	41.2	54.0	6.7	19.5	32.5	8 43 6.78	8.02½	2 24.90	6.28			
41	Washington . . .	13.2	26.0	39.0	51.8	5.0	8 45 39.00	—2.97					
42	Mars . . . S.F.	39.0	52.0	4.8	17.5	30.4	8 48 4.74	+2.44	2 25.74	5.41			
43	Washington . . .	57.3	10.1	22.9	35.6	48.6	8 50 22.90	—2.92½					
44 *a*	Mars . . . N.P.	21.5	34.5	47.1	59.6	12.8	8 52 47.10	+3.43	2 24.20	6.35½			
45	Washington . . .	41.0	54.0	6.8	19.5	32.5	8 55 6.76	—2.75½					
46	Mars . . . S.F.	6.2	19.2	32.0	44.6	57.7	8 57 31.94	+2.87	2 25.18	5.62½			
47	Washington . . .	56.5	9.5	22.4	35.1	48.0	8 59 22.30	—2.62			27.980	61.0	58.8
48 *c*	Mars . . . N.P.	20.2	33.0	45.8	58.5	16.5	9 1 45.80	+3.87	2 23.50	6.49			
49	Washington . . .	. .	5.3	18.2	31.0	44.0	9 4 18.21	—2.45			Ther. att. 67°.5		
50 *c*	Mars . . . S.F.	17.0	29.6	42.5	55.3	8.2	9 6 42.52	+3.29	2 24.31	5.74	Bar. red. to 32° F.		
51	Washington . . .	. .	15.7	28.5	41.5	54.2	9 8 28.56	—2.25½			27.875		
52 *c*	Mars . . . N.P.	25.5	38.4	51.4	4.1	17.0	9 10 51.28	+4.38	+2 22.72	+6.63½			

Remarks.

Unless when otherwise noted, the planet has generally been sharp and steady, and the measures very fair. The star does not appear so bright as many of Bessel's 9ths; but from the faintness of the colored portions of Mars, there is evidently some haze, or my eye is over-worked.

a Tremulous. *b* Recorded 4.0*s*. at wire B. *c* Fine.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Thirteen transits . .	8 9 54.05	+2 28.496 . . .	+4.902	=1 35.54
Mean N. P. . . .	Thirteen transits . .	8 14 28.47	+2 26.958 . . .	+5.845	=1 53.92

	m. s.
Correction for chronometer at 8 10 (h. m.)	—3 0.94
Correction for chronometer at 8 14	—3 0.95

	h. m. s.
Santiago sid. time S. F.	8 6 53.11
Santiago sid. time N. P.	8 11 27.52
Interval	4 34.41

	″
Δ P. F. limbs in A. R. reduced to arc . . .	23.07
Variation of A. R. in 4*m*. 34*s*.	— 4.79
Observed P. F. diameter	18.28

	″
Δ N. S. limbs micr. in rev. . . . . . 0.943 =	18.38
Variation of declination in 4*m*. 34*s*. . .	— 1.22
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	14.96

h. m.	″
Δ ρ at 8 6	0.09
Δ ρ at 8 10	0.11

JANUARY 23, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Washington . . .	59.0	11.8	24.6	37.4	50.3	6 55 24.62	+3.59½			28.064	64.0	58.1
2	Mars . . . S.F.	0.5	13.5	26.3	39.0	52.3	6 58 26.32	—3.33	+3 1.70	—6.92½			
3	Washington . . .	14.0	26.9	39.8	52.5	5.6	7 0 39.76	+3.38			Ther. att. 69°.5		
4	Mars . . . N.P.	14.3	27.0	40.2	52.7	5.5	7 3 39.94	—2.65½	3 0.18	6.03½	Bar. red. to 32° F.		
5	Washington . . .	36.5	49.5	2.3	15.0	28.0	7 6 2.26	+3.19			27.953		
6	Mars . . . S.F.	37.5	50.3	3.2	16.0	29.0	7 9 3.20	—3.65	3 0.94	6.84			
7	Washington . . .	33.5	46.4	59.3	12.0	25.0	7 11 59.24	+3.05½					
8	Mars . . . N.P.	33.2	46.1	59.0	11.7	24.6	7 14 58.92	—2.84½	2 59.68	5.90			
9	Washington . . .	33.6	46.5	59.5	12.4	25.3	7 17 59.46	+2.83					
10	Mars . . . S.F.	33.8	46.7	59.5	12.3	25.5	7 20 59.56	—3.87	3 0.10	6.70			
11	Washington . . .	43.0	55.9	8.6	21.4	34.6	7 23 8.70	+2.62					
12	Mars . . . N.P.	41.7	54.5	7.4	20.1	33.2	7 26 7.38	—3.14	2 58.68	5.76			
13	Washington . . .	41.5	54.4	7.2	20.0	33.0	7 28 7.22	+2.40					
14	Mars . . . S.F.	40.8	53.5	6.5	19.2	32.3	7 31 6.46	—4.12	2 59.24	6.52			
15	Washington . . .	50.8	3.5	16.4	29.4	42.5	7 33 16.52	+2.24					
16	Mars . . . N.P.	48.5	1.4	14.5	27.2	40.2	7 36 14.36	—3.33	2 57.84	5.57			
17	Washington . . .	45.5	58.2	11.0	24.3	37.0	7 38 11.20	+2.07					
18	Mars . . . S.F.	44.0	57.0	9.8	22.5	35.5	7 41 9.76	—4.29	2 58.56	6.36			
19	Washington . . .	22.5	. .	48.4	. .	14.3	7 43 48.39	+2.05					
20	Mars . . . N.P.	19.5	32.4	45.3	58.0	11.0	7 46 45.24	—3.39	2 56.85	5.44			
21	Washington . . .	53.0	5.9	18.8	31.6	44.6	7 49 18.78	+1.98					
22	Mars . . . S.F.	51.0	3.6	16.5	29.3	42.3	7 52 16.54	—4.26	2 57.76	6.24			
23	Washington . . .	57.8	10.7	23.6	36.5	49.5	7 54 23.62	+1.90½					
24	Mars . . . N.P.	54.0	6.8	19.6	32.4	45.4	7 57 19.64	—3.40½	2 56.02	5.31			
25	Washington . . .	55.0	7.8	20.7	33.5	46.5	7 59 20.70	+1.86					
26	Mars . . . S.F.	52.0	4.8	17.5	30.5	43.5	8 2 17.66	—4.24	2 56.96	6.10			
27	Washington . . .	11.6	24.4	37.4	50.3	3.4	8 4 37.42	+1.84					
28 a	Mars . . . N.P.	7.0	20.2	33.0	45.7	58.5	8 7 32.88	—3.30	2 55.46	5.14			
29	Washington . . .	51.5	4.5	17.4	30.3	43.4	8 10 17.42	+1.83					
30	Mars . . . S.F.	48.0	0.7	13.5	26.3	39.4	8 13 13.58	—4.09	2 56.16	5.92			
31	Washington . . .	45.5	58.4	11.3	24.0	37.0	8 15 11.24	+1.88½					
32	Mars . . . N.P.	40.3	53.2	6.1	18.6	31.5	8 18 5.94	—3.11½	2 54.70	5.00			
33	Washington . . .	3.2	16.2	29.0	41.7	54.6	8 20 28.94	+1.90					
34	Mars . . . S.F.	58.7	11.5	24.5	37.2	50.2	8 23 24.42	—3.88	2 55.48	5.78			
35	Washington . . .	14.7	27.6	40.5	53.4	6.5	8 25 40.54	+1.97					
36	Mars . . . N.P.	8.5	21.4	34.3	47.2	0.2	8 28 34.32	—2.92	2 53.78	4.89			
37	Washington . . .	34.3	47.2	0.0	12.8	26.0	8 31 0.06	+0.99					
38	Mars . . . S.F.	29.0	. .	54.7	7.5	20.5	8 33 54.70	—4.65	2 54.64	5.64			
39	Washington . . .	19.8	33.6	46.4	59.5	12.3	8 35 46.32	+1.08					
40	Mars . . . N.P.	14.0	26.8	39.6	52.5	5.5	8 38 39.68	—3.57½	2 53.36	4.65½			
41	Washington . . .	44.5	57.4	10.3	23.2	36.0	8 41 10.28	+1.23½					
42	Mars . . . S.F.	38.5	51.4	4.3	18.0	30.3	8 44 4.50	—4.28	2 54.22	5.51½			
43	Washington . . .	26.0	38.8	51.5	4.5	17.5	8 48 51.66	+1.50½					
44	Mars . . . N.P.	18.2	31.0	43.7	56.8	9.6	8 51 43.86	—3.12	2 52.20	4.62½			
45	Washington . . .	37.5	50.3	3.3	16.2	29.2	8 55 3.30	+1.63					
46	Mars . . . S.F.	30.5	43.2	56.0	8.8	21.8	8 57 56.06	—3.65½	+2 52.76	—5.28½			

JANUARY 23, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Washington . . .	31.5	44.6	57.5	10.2	23.2	8 59 57.40	+1.87			28.050	60.7	56.0
48	Mars . . . N.P.	23.0	36.0	48.8	1.6	14.5	9 2 48.78	—2.50½	+2 51.38	—4.37½			
49	Washington . . .	33.4	46.2	59.1	12.0	24.8	9 6 59.10	+2.04			Ther. att. 67°.5 Bar. red. to 32° F. 27.945		
50	Mars . . . S.F.	25.5	38.3	51.0	3.8	17.0	9 9 51.12	—3.07½	2 52.02	5.11½			
51	Washington . . .	11.5	24.4	37.3	50.2	3.2	9 11 37.32	+2.30½					
52	Mars . . . N.P.	2.0	14.9	27.8	40.6	53.5	9 14 27.76	—1.96	+2 50.44	—4.26½			

Remarks.

Objects a little blurred and tremulous at times, but throughout the measures have been satisfactory. The star is certainly very small for an 8th, and its difference of declination is scarcely more than half what it ought to be by the Ephemeris. However, the Washington observations were only approximate. There is no other star corresponding near so well.

a Fine.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Thirteen transits . .	8 2 54.15	+2 56.965	6.072	—1 58.34
Mean N. P. . .	Thirteen transits . .	8 8 13.75	+2 55.428	5.131	—1 40.00

	h. m.	m. s.
Correction for chronometer at	8 3 . . .	—3 4.31
Correction for chronometer at	8 8 . . .	—3 4.32

	h. m. s.
Santiago sid. time S. F.	7 59 49.84
Santiago sid. time N. P.	8 5 9.43
Interval	5 19.59

	″
Δ P. F. limbs in A. R. reduced to arc . . .	23.05
Variation of A. R. in 5*m.* 20*s.*	— 5.60
Observed P. F. diameter	17.45

	″
Δ N. S. limbs micr. in rev.	0.941 = 18.34
Variation of declination in 5*m.* 20*s.* . .	— 1.40
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	14.74

	h. m.	″
Δ ρ at	7 58	0.12
Δ ρ at	8 4	0.10

JANUARY 24, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 344	. .	. .	44.5	. .	. .	6 50 44.48	+ 9.22½			28.009	65.0	58.4
2	Mars . . . S.F.	. .	. .	54.5	. .	. .	6 51 54.48	—13.42	+1 10.00	—22.64½	Ther. att. 69°.0 Bar. red. to 32° F. 27.900		
3	Bessel . . . 344	. .	. .	55.0	. .	. .	6 53 54.98	+ 8.71					
4	Mars . . . N.P.	. .	. .	3.5	. .	. .	6 55 3.48	—12.58	1 8.50	21.29			
5	Bessel . . . 344	. .	. .	39.5	. .	. .	6 57 39.48	+ 9.28					
6	Mars . . . S.F.	. .	. .	48.8	. .	. .	6 58 48.78	—13.38	1 9.30	22.66			
7	Bessel . . . 344	. .	. .	53.5	. .	. .	7 1 53.48	+11.16					
8	Mars . . . N.P.	. .	. .	1.2	. .	. .	7 3 1.18	—10.78	1 7.70	21.94			
9	Bessel . . . 344	. .	. .	36.3	. .	. .	7 6 36.28	+10.72½					
10	Mars . . . S.F.	. .	. .	45.3	. .	. .	7 7 45.28	—11.86½	+1 9.00	—22.59			

JANUARY 24, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	Bessel . . . 344	. .	. .	43.7	. .	. .	7 9 43.68	+10.61			28.009	65.0	58.4
12	Mars . . . N.P.	. .	. .	51.2	. .	. .	7 10 51.18	—11.01½	+1 7.50	—21.62½			
13	Bessel . . . 344	. .	. .	22.0	. .	. .	7 12 21.98	+10.39			Ther. att. 69°.0		
14	Mars . . . S.F.	. .	. .	30.5	. .	. .	7 13 30.48	—12.09	1 8.50	22.48	Bar. red. to 32° F.		
15	Bessel . . . 344	. .	. .	36.0	. .	. .	7 15 35.98	+10.27			27.900		
16	Mars . . . N.P.	. .	. .	43.0	. .	. .	7 16 42.98	—11.23½	1 7.00	21.50½			
17	Bessel . . . 344	. .	. .	30.8	. .	. .	7 19 30.78	+10.11					
18	Mars . . . S.F.	. .	. .	38.5	. .	. .	7 20 38.48	—12.33	1 7.70	22.44			
19	Bessel . . . 344	. .	. .	24.5	. .	. .	7 23 24.48	+ 9.65					
20	Mars . . . N.P.	. .	. .	30.8	. .	. .	7 24 30.78	—11.73½	1 6.30	21.38½			
21	Bessel . . . 344	. .	. .	44.6	. .	. .	7 26 44.58	+ 9.57½					
22	Mars . . . S.F.	. .	. .	52.0	. .	. .	7 27 51.98	—12.73½	1 7.40	22.31			
23	Bessel . . . 344	. .	. .	0.5	. .	. .	7 30 0.48	+ 9.37½					
24	Mars . . . N.P.	. .	. .	6.1	. .	. .	7 31 6.08	—11.83	1 5.60	21.20½			
25	Bessel . . . 344	. .	. .	21.6	. .	. .	7 32 21.58	+ 9.38½					
26	Mars . . . S.F.	. .	. .	28.3	. .	. .	7 33 28.28	—12.84	1 6.70	22.22½			
27	Bessel . . . 344	. .	. .	30.0	. .	. .	7 36 29.98	+ 9.29					
28	Mars . . . N.P.	. .	. .	35.5	. .	. .	7 37 35.48	—11.98	1 5.50	21.27			
29	Bessel . . . 344	. .	. .	37.5	. .	. .	7 39 37.48	+ 9.13½					
30	Mars . . . S.F.	. .	. .	44.3	. .	. .	7 40 44.28	—12.93	1 6.80	22 06½			
31	Bessel . . . 344	. .	. .	47.0	. .	. .	7 42 46.98	+ 9.10½					
32	Mars . . . N.P.	. .	. .	52.6	. .	. .	7 43 52.58	—11.98	1 5.60	21.08½			
33	Bessel . . . 344	. .	. .	20.0	. .	. .	7 45 19.98	+ 9.08					
34	Mars . . . S.F.	. .	. .	26.0	. .	. .	7 46 25.98	—12.97	1 6.00	22.05			
35	Bessel . . . 344	. .	. .	41.7	. .	. .	7 47 41.68	+ 9.06					
36	Mars . . . N.P.	. .	. .	46.5	. .	. .	7 48 46.48	—12.02½	1 4.80	21.08½			
37	Bessel . . . 344	. .	. .	4.0	. .	. .	7 50 3.98	+ 9.03					
38	Mars . . . S.F.	. .	. .	9.7	. .	. .	7 51 9.68	—12.98	1 5.70	22.11			
39	Bessel . . . 344	. .	. .	35.0	. .	. .	7 54 34.98	+10.19					
40	Mars . . . N.P.	. .	. .	39.0	. .	. .	7 55 38.98	—10.78½	1 4.00	20.97½			
41	Bessel . . . 344	. .	. .	9.5	. .	. .	7 57 9.48	+10.10					
42	Mars . . . S.F.	. .	. .	15.0	. .	. .	7 58 14.98	—11.82	1 5.50	21.92			
43	Bessel . . . 344	. .	. .	9.0	. .	. .	8 0 8.98	+10.09					
44	Mars . . . N.P.	. .	. .	13.0	. .	. .	8 1 12.98	—10.82	1 4.00	20.91			
45	Bessel . . . 344	. .	. .	10.7	. .	. .	8 3 10.68	+10.03					
46	Mars . . . S.F.	. .	. .	15.5	. .	. .	8 4 15.48	—11.74	1 4.80	21.77			
47	Bessel . . . 344	. .	. .	49.5	. .	. .	8 8 49.48	+ 9.41½					
48	Mars . . . N.P.	. .	. .	52.3	. .	. .	8 9 52.28	—11.37½	1 2.80	20.79			
49	Bessel . . . 344	. .	. .	13.3	. .	. .	8 11 13.28	+ 9.42					
50	Mars . . . S.F.	. .	. .	17.3	. .	. .	8 12 17.28	—12.20½	1 4.00	21.62½			
51	Bessel . . . 344	. .	. .	14.4	. .	. .	8 15 14.38	+ 9.42					
52	Mars . . . N.P.	. .	. .	16.9	. .	. .	8 16 16.88	—11.20½	1 2.50	20.62½			
53	Bessel . . . 344	. .	. .	30.5	. .	. .	8 17 30.48	+ 9.45					
54	Mars . . . S.F.	. .	. .	34.0	. .	. .	8 18 33.98	—12.11	1 3.50	21.56			
55	Bessel . . . 344	. .	. .	51.5	. .	. .	8 19 51.48	+ 9.50½					
56	Mars . . . S.F.	. .	. .	55.5	. .	. .	8 20 55.48	—12.03	+1 4.00	—21.53½			

JANUARY 24, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
57	Bessel . . . 344	. .	. .	3.8	. .	. .	8 23 3.78	+ 9.48½			28.000	59.2	58.0
58	Mars . . . N.P.	. .	. .	5.6	. .	. .	8 24 5.58	—11.05	+1 1.80	—20.53½			
59	Bessel . . . 344	. .	. .	40.2	. .	. .	8 25 40.18	+ 9.55			Ther. att. 68°.0 Bar. red. to 32° F. 27.993		
60	Mars . . . N.P.	. .	. .	42.1	. .	. .	8 26 42.08	—11.04	1 1.90	20.59			
61	Bessel . . . 344	. .	. .	35.6	. .	. .	8 29 35.58	+ 9.50					
62	Mars . . . S.F.	. .	. .	38.0	. .	. .	8 30 37.98	—11.90	1 2.40	21.40			
63	Bessel . . . 344	. .	. .	44.0	. .	. .	8 32 43.98	+ 9.54					
64	Mars . . . N.P.	. .	. .	45.2	. .	. .	8 33 45.18	—10.85	1 1.20	20.39			
65	Bessel . . . 344	. .	. .	22.4	. .	. .	8 35 22.38	+ 9.58½					
66	Mars . . . S.F.	. .	. .	24.0	. .	. .	8 36 23.98	—11.62	1 1.60	21.20½			
67	Bessel . . . 344	. .	. .	54.3	. .	. .	8 37 54.28	+ 9.68					
68	Mars . . . N.P.	. .	. .	55.5	. .	. .	8 38 55.48	—10.72½	1 1.20	20.40½			
69	Bessel . . . 344	. .	. .	37.5	. .	. .	8 40 37.48	+ 9.72					
70	Mars . . . S.F.	. .	. .	39.5	. .	. .	8 41 39.48	—11.48	1 2.00	21.20			
71	Bessel . . . 344	. .	. .	36.0	. .	. .	8 43 35.98	+ 9.78					
72	Mars . . . N.P.	. .	. .	36.5	. .	. .	8 44 36.48	—10.53	1 0.50	20.31			
73	Bessel . . . 344	. .	. .	17.5	. .	. .	8 46 17.48	+ 9.86					
74	Mars . . . S.F.	. .	. .	19.1	. .	. .	8 47 19.08	—11.27½	1 1.60	21.13½			
75	Bessel . . . 344	. .	. .	41.5	. .	. .	8 48 41.48	+ 9.95½					
76	Mars . . . N.P.	. .	. .	41.4	. .	. .	8 49 41.38	—10.25	0 59.90	20.20½			
77	Bessel . . . 344	. .	. .	25.5	. .	. .	8 51 25.48	+10.01½					
78	Mars . . . S.F.	. .	. .	27.2	. .	. .	8 52 27.18	—11.03½	1 1.70	21.05			
79	Bessel . . . 344	. .	. .	4.5	. .	. .	8 56 4.48	+10.20					
80	Mars . . . N.P.	. .	. .	4.0	. .	. .	8 57 3.98	— 9.94½	0 59.50	20.14½			
81	Bessel . . . 344	. .	. .	1.6	. .	. .	8 59 1.58	+10.31½					
82	Mars . . . S.F.	. .	. .	2.0	. .	. .	9 0 1.98	—10.71	1 0.40	21.02½			
83	Bessel . . . 344	. .	. .	36.5	. .	. .	9 1 36.48	+10.43					
84	Mars . . . N.P.	. .	. .	35.5	. .	. .	9 2 35.48	— 9.63½	0 59.00	20.06½			
85	Bessel . . . 344	. .	. .	46.0	. .	. .	9 4 45.98	+10.53					
86	Mars . . . S.F.	. .	. .	46.4	. .	. .	9 5 46.38	—10.36½	1 0.40	20.89½			
87	Bessel . . . 344	. .	. .	53.5	. .	. .	9 7 53.48	+10.73					
88	Mars . . . N.P.	. .	. .	52.0	. .	. .	9 8 51.98	— 9.23½	0 58.50	19.96½			
89	Bessel . . . 344	. .	. .	7.0	. .	. .	9 10 6.98	+10.83					
90	Mars . . . S.F.	. .	. .	7.0	. .	. .	9 11 6.98	—10.00	1 0.00	20.83			
91	Bessel . . . 344	. .	. .	36.0	. .	. .	9 12 35.98	+10.95½					
92	Mars . . . N.P.	. .	. .	34.3	. .	. .	9 13 34.28	— 8.99	+0 58.30	—19.94½			

Remarks.

At the commencement and during the first hour, the images were quite blurred and unsteady; but afterwards extremely sharp and their motions equable. The great difference of Dec. of the objects and small difference of A. R. required such a rapid movement of the micrometer screw, that the measures are not very satisfactory. There is, no doubt, some parallax also.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S.F. .	Twenty-three transits . .	8 3 59.47	+1 4.739 . . .	—21.771	=7 4.32
Mean N.P. .	Twenty-three transits . .	8 7 50.58	+1 3.200 . . .	—20.837	=6 46.11

JANUARY 24, 1852—Continued.

Results—Continued.

	h. m.	m. s.
Correction for chronometer at	8 4	—3 6.99
Correction for chronometer at	8 8	—3 6.99

	h. m. s.
Santiago sid. time for S. F.	8 0 52.48
Santiago sid. time for N. P.	8 4 43.59
Interval	3 51.11

	″
Δ P. F. limbs in A. R. reduced to arc	23.08
Variation of A. R. in 3*m*. 51*s*.	— 4.02
Observed P. F. diameter	19.06

	″
Δ N. S. limbs micr. in rev.	0.934 = 18.21
Variation of declination in 3*m*. 51*s*.	— 0.99
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	— 15.02

	h. m.	″
Δ ρ at	8 0	0.40
Δ ρ at	8 4	0.38

JANUARY 25, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1 a	Mars	S.F.	. .	. .	52.0	. .	. .	6 47 51.98	—7.56½			28.005	63.0	58.0
2	Bessel	344	. .	. .	23.5	. .	. .	6 48 23.48	3.56	—31.50	—4.00½			
3	Mars	N.P.	. .	. .	25.5	. .	. .	6 50 25.48	6.75½			Ther. att. 68°.2 Bar. red. to 32° F. 27.897		
4	Bessel	344	. .	. .	58.5	. .	. .	6 50 58.48	3.68	33.00	3.07½			
5	Mars	S.F.	. .	. .	20.4	. .	. .	6 53 20.38	7.64					
6	Bessel	344	. .	. .	52.3	. .	. .	6 53 52.28	3.78	31.90	3.86			
7	Mars	N.P.	. .	. .	13.5	. .	. .	6 55 13.48	6.85					
8	Bessel	344	. .	. .	46.6	. .	. .	6 55 46.58	3.87	33.10	2.98			
9	Mars	S.F.	. .	. .	46.5	. .	. .	6 57 46.48	7.82					
10	Bessel	344	. .	. .	18.5	. .	. .	6 58 18.48	4.01	32.00	3.81			
11	Mars	N.P.	. .	. .	40.4	. .	. .	6 59 40.38	6.97½					
12	Bessel	344	. .	. .	13.5	. .	. .	7 0 13.48	4.06	33.10	2.91½			
13	Mars	S.F.	. .	. .	14.3	. .	. .	7 2 14.38	7.91					
14	Bessel	344	. .	. .	46.7	. .	. .	7 2 46.68	4.13½	32.40	3.77½			
15	Mars	N.P.	. .	. .	44.5	. .	. .	7 3 44.48	7.07					
16	Bessel	344	. .	. .	18.0	. .	. .	7 4 17.98	4.21	33.50	2.86			
17	Mars	S.F.	. .	. .	47.2	. .	. .	7 5 47.18	8.03					
18	Bessel	344	. .	. .	20.0	. .	. .	7 6 19.98	4.31	32.80	3.72			
19	Mars	N.P.	. .	. .	21.6	. .	. .	7 7 21.58	7.19½					
20	Bessel	344	. .	. .	55.5	. .	. .	7 7 55.48	4.29	33.90	2.90½			
21	Mars	S.F.	. .	. .	4.6	. .	. .	7 10 4.58	8.03					
22	Bessel	344	. .	. .	37.5	. .	. .	7 10 37.68	4.38½	32.90	3.64½			
23	Mars	N.P.	. .	. .	43.0	. .	. .	7 11 42.98	7.20					
24	Bessel	344	. .	. .	17.2	. .	. .	7 12 17.18	4.43	34.20	2.77			
25	Mars	S.F.	. .	. .	14.8	. .	. .	7 13 14.78	8.12					
26	Bessel	344	. .	. .	48.0	. .	. .	7 13 47.98	4.47	33.20	3.65			
27	Mars	N.P.	. .	. .	0.9	. .	. .	7 15 0.88	7.31					
28	Bessel	344	. .	. .	35.5	. .	. .	7 15 35.48	4.61	34.60	2.70			
29	Mars	S.F.	. .	. .	32.5	. .	. .	7 16 32.48	8.28					
30	Bessel	344	. .	. .	5.5	. .	. .	7 17 5.48	4.67	33.00	3.61			
31	Mars	N.P.	. .	. .	38.8	. .	. .	7 18 38.78	7.39					
32	Bessel	344	. .	. .	13.5	. .	. .	7 19 13.48	4.73½	34.70	2.65½			
33	Mars	S.F.	. .	. .	8.0	. .	. .	7 23 7.98	8.46					
34	Bessel	344	. .	. .	42.0	. .	. .	7 23 41.98	—4.91	—34.00	—3.55			

JANUARY 25, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
35	Mars . . . N.P.	. .	. .	4.7	. .	. .	7 25 4.68	—7.53½			27.996	61.0	58.5
36	Bessel . . . 344	. .	. .	40.2	. .	. .	7 25 40.18	4.96½	—35.50	—2.57			
37	Mars . . . S.F.	. .	. .	40.0	. .	. .	7 26 39.98	8.46			Ther. att. 66.°0		
38	Bessel . . . 344	. .	. .	14.3	. .	. .	7 27 14.28	5.05	34.30	3.41	Bar. red. to 32° F.		
39	Mars . . . N.P.	. .	. .	16.5	. .	. .	7 28 16.48	7.61			27.895		
40	Bessel . . . 344	. .	. .	52.0	. .	. .	7 28 51.98	5.09	35.50	2.52			
41 *b*	Mars . . . S.F.	. .	. .	57.5	. .	. .	7 30 57.48	8.49					
42	Bessel . . . 344	. .	. .	32.0	. .	. .	7 31 31.98	5.13	34.50	3.36			
43	Mars . . . N.P.	. .	. .	33.5	. .	. .	7 32 33.48	7.68					
44	Bessel . . . 344	. .	. .	9.2	. .	. .	7 33 9.18	5.23	35.70	2.45			
45	Mars . . . S.F.	. .	. .	3.7	. .	. .	7 34 3.68	8.61					
46	Bessel . . . 344	. .	. .	38.3	. .	. .	7 34 38.28	5.19	34.60	3.42			
47 *c*	Mars . . . N.P.	. .	. .	31.2	. .	. .	7 35 31.18	7.65					
48	Bessel . . . 344	. .	. .	7.3	. .	. .	7 36 7.28	5.23½	36.10	2.41½			
49	Mars . . . S F.	. .	. .	35.7	. .	. .	7 37 35 68	8.61					
50	Bessel . . . 344	. .	. .	10.6	. .	. .	7 38 10.58	5.24	34.90	3.37			
51	Mars . . . N.P.	. .	. .	15.6	. .	. .	7 39 15.58	7.72					
52	Bessel . . . 344	. .	. .	52.1	. .	. .	7 39 52.08	5.30½	36.50	2.41½			
53 *d*	Mars . . . S.F.	. .	. .	53.4	. .	. .	7 40 53.38	8.59					
54	Bessel . . . 344	. .	. .	28.6	. .	. .	7 41 28.58	5.38½	35.20	3.20½			
55	Mars . . . N.P.	. .	. .	25.6	. .	. .	7 42 25.58	7.73					
56	Bessel . . . 344	. .	. .	2.2	. .	. .	7 43 2.18	5.37	36.60	2.36			
57	Mars . . . S.F.	. .	. .	5.7	. .	. .	7 44 5.68	8.63½					
58	Bessel . . . 344	. .	. .	41.2	. .	. .	7 44 41.18	5.42	35.50	3.21½			
59	Mars . . . N.P.	. .	. .	32.7	. .	. .	7 45 32.68	7.76					
60	Bessel . . 344	. .	. .	9.3	. .	. .	7 46 9.28	5.39	36.60	2.37			
61	Mars . . . S.F.	. .	. .	28.6	. .	. .	7 47 28.58	8.62½					
62	Bessel . . . 344	. .	. .	4.5	. .	. .	7 48 4.48	5.43	35.90	3.19½			
63	Mars . . . N.P.	. .	. .	45.5	. .	. .	7 48 45.48	7.78					
64	Bessel . . . 344	. .	. .	22.5	. .	. .	7 49 22.48	5.47½	37.00	2.30½			
65	Mars . . . S.F.	. .	. .	3.2	. .	. .	7 50 3.18	8.69½					
66	Bessel . . . 344	. .	. .	39.0	. .	. .	7 50 38.98	5.49	35.80	3.20½			
67	Mars . . . N P.	. .	. .	21.6	. .	. .	7 51 21.58	7.75½					
68	Bessel . . . 344	. .	. .	59.0	. .	. .	7 51 58.98	—5.51	—37.40	—2.24½			

Remarks.

a During the first twenty observations, the objects were ill-defined and unsteady.

b Sharp, but still unsteady.

c Very fair.

d Good.

Results.

			h. m. s.	s.	Rev.	′ ″
Mean S. F. . .	Seventeen transits . .		7 21 16.93	— 33.788	— 3.529 . . .	= 1 8.78
Mean N. P. . .	Seventeen transits . .		7 22 58.51	— 35.118	— 2.560 . . .	= 0 49.89

JANUARY 25, 1852—Continued.

Results—Continued.

	h. m.	m. s.
Correction for chronometer at	7 21	—3 9.55
Correction for chronometer at	7 23	—3 9.55

	h. m. s.
Santiago sid. time S. F.	7 18 7.38
Santiago sid. time N. P.	7 19 48.96
Interval	1 41.58

	″
Δ P. F. limbs in A. R. reduced to arc	19.95
Variation of A. R. in 1*m.* 42*s.*	— 1.78
Observed P. F. diameter	18.17

	″
Δ N. S. limbs micr. in rev.	0.969 = 18.89
Variation of declination in 1*m.* 42*s.*	— 0.42
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	16.27

	h. m.	″
Δ ρ at	7 18	0.07
Δ ρ at	7 20	0.05

JANUARY 26, 1852.

There is no star in the place assigned to that in the Ephemeris. The nearest one to it is a star of the 14th or 15th magnitude, (just visible,) which is about 12*s.* farther east and 30″ north. Of course, it would not bear illumination, and no observations were attempted.

JANUARY 27, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	2.5	15.5	28.2	41.0	54.0	6 7 28.24	—3.82			28.000	67.5	59.5
2	Washington . . .	8.5	21.8	34.5	47.4	0.5	6 10 34.54	+3.41	—3 6.30	—7.23			
3	Mars . . . N.P.	23.5	36.3	49.2	20.0	15.0	6 12 49.20	—3.42			Ther. att. 70°.4 Bar. red. to 32° F. 27.886		
4	Washington . . .	31.5	44.4	57.3	10.0	23.0	6 15 57.24	+3.00	3 8.04	6.42			
5	Mars . . . S.F.	29.2	42.2	55.0	7.6	20.7	6 17 54.94	—4.56					
6	Washington . . .	36.5	49.5	2.3	15.0	28.0	6 21 2.26	+2.62½	3 7.32	7.18½			
7	Mars . . . N.P.	34.6	47.6	0.3	13.0	26.3	6 23 0.36	—4.05					
8	Washington . . .	43.5	56.5	9.5	22.5	34.0	6 26 9.20	+2.19	3 8.84	6.24			
9	Mars . . . S.F.	4.6	17.5	30.3	43.2	56.2	6 28 30.36	—5.27					
10	Washington . . .	12.5	25.5	38.5	51.0	4.0	6 31 38.30	+1.69	3 7.94	6.96			
11	Mars . . . N.P.	37.3	50.2	3.0	15.8	28.7	6 34 3.00	—4.73					
12	Washington . . .	46.5	59.6	12.5	25.4	38.5	6 37 12.50	+1.36	3 9.50	6.09			
13*a*	Mars . . . S.F.	59.3	12.5	25.6	38.4	51.6	6 39 25.48	—5.83					
14	Washington . . .	8.5	21.5	34.4	47.3	0.2	6 42 34.38	+1.02	3 8.90	6.85			
15*b*	Mars . . . N.P.	49.6	2.5	15.5	28.6	41.5	6 57 15.54	—1.83½					
16	Washington . . .	1.0	14.0	26.8	39.7	52.6	7 0 26.82	+4.03	3 11.28	5.86½			
17	Mars . . . S.F.	52.8	5.7	18.6	31.5	44.6	7 2 18.64	—2.92					
18	Washington . . .	3.2	16.5	29.4	42.0	55.0	7 5 29.22	+3.60½	3 10.58	6.52½			
19	Mars . . . N.P.	10.6	23.5	36.3	49.3	2.2	7 7 36.38	—2.30½					
20	Washington . . .	22.5	35.4	48.4	1.5	14.3	7 10 48.42	+3.41	3 12.04	5.71½			
21	Mars . . . S.F.	18.6	31.6	45.0	57.2	10.5	7 12 44.58	—3.21½					
22	Washington . . .	30.0	43.0	55.6	8.6	21.6	7 15 55.76	+3.22	3 11.18	6.43½			
23	Mars . . . N.P.	20.6	33.5	46.7	59.3	12.0	7 17 46.42	—2.50					
24	Washington . . .	33.2	46.2	59.0	11.8	25.0	7 20 59.04	+3.09	3 12.62	5.59			
25	Mars . . . S.F.	25.0	38.0	51.0	3.7	16.8	7 22 50.90	—3.42½					
26	Washington . . .	37.0	49.9	2.7	15.5	28.5	7 26 2.72	+2.94	3 11.82	6.36½			
27	Mars . . . N.P.	31.0	44.0	56.7	9.5	22.5	7 28 56.74	—2.66½					
28	Washington . . .	44.6	57.4	10.5	23.3	36.4	7 32 10.44	+2.76½	—3 13.70	—5.43			

JANUARY 27, 1852—Continued.														
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ a.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
29	Mars . . . S.F.	10.5	23.3	36.3	49.0	2.0	7 34 36.22	—3.57			27.984	60.5	57.0
30	Washington . . .	23.1	36.2	49.0	2.0	15.0	7 37 49.06	+2.64½	—3 12.84	—6.21½			
31 c	Mars . . . N.P.	33.7	46.7	59.7	12.5	25.4	7 43 59.60	—2.80			Ther. att. 69°.4		
32	Washington . . .	. .	1.5	14.3	27.2	40.1	7 47 14.30	+2.48½	3 14.70	5.28½	Bar. red. to 32° F.		
33	Mars . . . S.F.	55.6	8.8	21.6	34.6	47.7	7 49 21.66	—3.58½			27.873		
34	Washington . . .	10.0	22.7	35.9	48.6	1.5	7 52 35.74	+2.42	3 14.08	6.00½			
35	Mars . . . N.P.	25.2	38.0	51.0	3.8	16.8	7 55 50.96	—2.79					
36	Washington . . .	. .	53.6	6.6	19.4	32.3	7 59 6.50	+2.34	3 15.54	5.13			
37 d	Mars . . . S.F.	13.5	26.4	39.2	52.0	5.3	8 1 39.28	—3.50					
38	Washington . . .	28.1	41.2	54.1	7.0	20.0	8 4 54.08	+2.32½	3 14.80	5.82½			
39	Mars . . . N.P.	29.6	42.6	55.5	8.2	21.2	8 6 55.42	—2.64					
40	Washington . . .	46.0	58.8	11.8	24.6	37.5	8 10 11.74	+2.37	3 16.32	5.01			
41	Mars . . . S.F.	5.6	18.7	31.5	44.3	57.2	8 14 31.46	—3.30					
42	Washington . . .	21.5	34.4	47.4	0.2	13.0	8 17 47.30	+2.40	3 15.84	5.70			
43	Mars . . . N.P.	10.5	23.4	36.4	49.2	2.1	8 19 36.32	—2.46					
44	Washington . . .	27.6	40.6	53.5	6.4	19.3	8 22 53.48	+2.40	3 17.16	4.86			
45	Mars . . . S.P.	38.0	51.0	4.0	16.6	29.8	8 25 3.88	—3.10½					
46	Washington . . .	54.5	7.5	20.4	33.3	46.3	8 28 20.40	+2.46½	3 16.52	5.57			
47	Mars . . . N.P.	49.0	1.8	14.8	27.6	30.8	8 30 14.80	—2.19					
48	Washington . . .	6.7	19.8	32.8	45.5	58.5	8 33 32.66	+2.42	3 17.86	4.61			
49	Mars . . . S.F.	20.8	33.5	46.5	59.3	12.2	8 36 46.46	—4.08½					
50	Washington . . .	38.0	51.0	3.9	16.8	29.7	8 40 3.88	+1.32	3 17.42	5.40½			
51	Mars . . . N.P.	31.5	44.5	57.3	10.0	23.2	8 41 57.30	—3.10½					
52	Washington . . .	50.3	3.0	16.3	29.0	42.0	8 45 16.12	+1.45	3 18.82	4.55½			
53	Mars . . . S.F.	11.2	24 0	37.0	49.8	2.7	8 48 36.94	—3.15					
54	Washington . . .	29.7	42.5	55.5	8.3	21.0	8 51 55.40	+2.14	3 18.46	5.29			
55	Mars . . . N.P.	23.7	36.6	49.4	2.0	15.0	8 54 49.34	—3.10½					
56	Washington . . .	43.2	56.3	9.3	22.0	35.0	8 58 9.16	+1.25	3 19.82	4.35½			
57	Mars . . . S.F.	27.6	40.6	53.5	6.3	19.5	8 59 53.50	—3.62					
58	Washington . . .	47.0	59.8	12.9	25.7	38.6	9 3 12.80	+1.54	3 19.30	5.16			
59	Mars . . . N.P.	24.0	36.8	49.8	2.6	15.5	9 5 49.74	—2.43					
60	Washington . . .	44.5	57.5	10.4	23.2	36.1	9 9 10.34	+1.84½	—3 20 60	—4.27½			

Remarks.

A most superb night; the place of the comparing star is evidently 1*m.* too little in the Washington observations.

a Sharp and steady.
b First-rate. I cannot make better observations than those which follow.
c Magnifying power with all the rest, 235.
d Mars passing along 9″ or 10″ to the north of a 10th magnitude star.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Fifteen transits . .	7 34 46.84	—3 12.887	—6.181 . . .	=2 0.47
Mean N. P. . .	Fifteen transits . .	7 41 22.74	—3 14.443	—5.295 . . .	=1 43.20

h. m.	m. s.		h. m. s.
Correction for chronometer at 7 35 . . .	—3 14.14	Santiago sid. time S. F.	7 31 32.70
Correction for chronometer at 7 41 . . .	—3 14.15	Santiago sid. time N. P.	7 38 8.59
		Interval	6 35.89

JANUARY 27, 1852—Continued.

Results—Continued.

	″		″
Δ P. S. limbs in A. R. reduced to arc . .	23.34	Δ N. S. limbs micr. in rev.	0.886 = 17.27
Variation of A. R. in 6*m*. 36*s*.	— 6.88	Variation of declination in 6*m*. 36*s*. . .	— 1.53
Observed P. F. diameter	16.46	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.54

	″		″
Δ ρ at 7h 33m	0.12	Δ ρ at 7h 40m	0.10

JANUARY 28, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 16464	44.6	57.5	10.5	23.4	36.3	6 38 10.46	+3.32			27.990	66.6	55.2
2	Mars . . . S.F.	51.6	5.0	18.0	30.6	43.5	6 44 17.74	2.88	+6 7.28	—0.44			
3	H. C. . . . 16464	38.3	51.2	4 3	17.0	30.0	6 48 4.16	2.80			Ther. att. 70°.7 Bar. red. to 32° F. 27.875		
4	Mars . . . N.P.	43.8	56.8	9.6	22.4	35.3	6 54 9.53	3.31½	6 5.42	+0.51½			
5	H. C. . . . 16464	10.0	23.0	35.8	48.6	1.5	6 56 35.78	2.42½					
6	Mars . . . S F.	15.8	28.8	41.7	54.5	7.5	7 2 41.66	2.18½	6 5.88	—0.24			
7	H. C. . . . 16464	33.6	46.5	59.5	12.4	25.3	7 4 59.46	2.11					
8	Mars . . . N.P.	37.8	50.8	3.5	16.5	29.4	7 11 3.60	2.82½	6 4.14	+0.71½			
9	H. C. . . . 16464	. .	21.2	34.1	47.0	0.0	7 14 34.10	1.79					
10	Mars . . . S.F.	12.9	25.8	38.7	51.5	4.5	7 20 38.68	1.79	6 4.58	0.00			
11	H. C. . . . 16464	24.8	37.8	50.8	3.5	16.5	7 22 50.68	1.52					
12	Mars . . . N.P.	27.6	40.6	53.5	6.4	19.5	7 28 53.52	2.46½	6 2.84	0.94½			
13	H. C. . . . 16464	51.0	3.7	17.0	29.8	42.8	7 31 16.86	1.31½					
14	Mars . . . S.F.	54.2	7.3	20.3	33.0	46.0	7 37 20.16	1.52	6 3.30	0.20½			
15	H. C. . . . 16464	10.0	22.8	35.8	48.5	1.5	7 39 35.72	1.20					
16	Mars . . . N.P.	11.5	24.5	37.5	50.3	3.2	7 45 37.40	2.32	6 1.68	1.12			
17	H. C. . . . 16464	16.1	29.2	42.0	54.8	7.7	7 47 41.96	1.07					
18	Mars . . . S.F.	18.2	31.3	44.0	56.9	9.9	7 53 44.06	1.50½	6 2.10	0.43½			
19	H. C. . . . 16464	40.0	53.0	6.1	19.0	31.8	7 56 5.98	1.06½					
20	Mars . . . N.P.	40.6	53.7	6.5	19.4	32.3	8 2 6.50	2.40	6 0.52	1.33½			
21	H. C. . . . 16464	45.5	58.5	11.4	24.3	37.1	8 4 11.36	1.11					
22	Mars . . . S.F.	46.4	59.3	11.4	25.0	38.0	8 10 12.02	1.73½	6 0.66	0.62½			
23	H. C. . . . 16464	12.2	25.0	38.0	50.8	3.6	8 12 37.92	1.09					
24	Mars . . . N.P.	11.5	24.5	37.4	50.2	3.1	8 18 37.34	2.53	5 59.42	1.44			
25	H. C. . . . 16464	1.2	14.2	27.0	40.0	52.9	8 21 27.06	1.19½					
26	Mars . . . S.F.	1.0	13.8	26.5	39.5	52.7	8 27 26.70	2.00	5 59.64	0.80½			
27	H. C. . . . 16464	55.9	8.8	21.8	34.6	47.5	8 29 21.72	1.38½					
28	Mars . . . N.P.	54.0	6.5	19.5	32.4	45.5	8 35 19.58	3.07	5 57.86	1.68½			
29	H. C. . . . 16464	. .	41.0	53.7	6.4	19.5	8 37 53.67	1.63					
30	Mars . . . S.F.	26.5	39.3	52.2	. .	17.5	8 43 52.10	2.62½	5 58.43	0.99½			
31	H. C. . . . 16464	31.0	44.0	57.0	9.6	22.5	8 45 56.82	1.89					
32	Mars . . . N.P.	27.7	40.7	53.7	6.5	19.5	8 51 53.62	3.78	5 56.80	1.89	27.983	62.0	53.6
33	H. C. . . . 16464	34.5	47.4	0.4	13.2	26.0	8 54 0.30	2.24½					
34	Mars . . . S.F.	31.9	44.7	57.8	10.5	23.5	8 59 57.68	3.40	5 57.38	1.15½	Ther. att. 69.°5 Bar. red. to 32° F. 27.872		
35	H. C. . . . 16464	13.3	26.2	39.0	51.8	4.6	9 1 38.98	2.60					
36	Mars . . . N.P.	8.8	21.6	34.5	47.5	0.5	9 7 34.58	+4.68	+5 55.60	+2.08			

JANUARY 28, 1852—Continued.

Remarks.

Not so good a night as last night; but all the observations were made under a magnifying power of 235, and with great satisfaction. Quite a sharp earthquake early in the afternoon.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Nine transits	7 53 21.20	+6 2.139	+0.393	=0 7.66
Mean N. P.	Nine transits	8 1 41.75	+6 0.476	+1.303	=0 25.39

	m. s.		h. m. s.
Correction for chronometer at 7 53 (h. m.)	—3 16.90	Santiago sid. time S. F.	7 50 4.30
Correction for chronometer at 8 2	—3 16.91	Santiago sid. time N. P.	7 58 24.84
		Interval	8 20.54

	″		″
Δ P. F. limbs in A. R. reduced to arc	24.94	Δ N. S. limbs micr. in rev. . . 0,910 =	17.73
Variation of A. R. in 8*m*. 21*s*.	— 8.63	Variation of declination in 8*m*. 21*s*.	— 1.87
Observed P. F. diameter	16.31	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.66

h. m.	″	h. m.	″
Δ ρ at 7 47	0.00	Δ ρ at 7 55	0.02

JANUARY 29, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Washington . . .	. .	. .	31.5	. .	. .	7 13 31.48	—4.07			28.050	64.0	53.7
2	Mars . . . S.F.	. .	. .	7.6	. .	. .	7 14 7.58	+3.68	+36.10	+7.75			
3	Washington . . .	. .	. .	12.0	. .	. .	7 16 11.98	—4.31			Ther. att. 68°.7 Bar. red. to 32° F. 27 [illegible]		
4	Mars . . . N.P.	. .	. .	47.2	. .	. .	7 16 47.18	+4.42	35.20	8.73			
5	Washington . . .	. .	. .	18.5	. .	. .	7 18 18.48	—4.38½					
6	Mars . . . S.F.	. .	. .	54.8	. .	. .	7 18 54.78	+3.58	36.30	7.96½			
7	Washington . . .	. .	. .	18.5	. .	. .	7 21 18.48	—4.42					
8	Mars . . . N.P.	. .	. .	53.0	. .	. .	7 21 52.98	+4.39	34.50	8.81			
9	Washington . . .	. .	. .	15.6	. .	. .	7 23 15.58	—4.57					
10 *a*	Mars . . . S.F.	. .	. .	51.0	. .	. .	7 23 50.98	+3.50½	35.40	8.07½			
11	Washington . .	. .	. .	9.5	. .	. .	7 26 9.48	—4.60½					
12	Mars . . . N.P.	. .	. .	44.0	. .	. .	7 26 43.98	+4.18½	34.50	8.79			
13	Washington . . .	. .	. .	43.3	. .	. .	7 28 43.28	—4.72					
14	Mars . . . S.F.	. .	. .	19.2	. .	. .	7 29 19.18	+3.33½	35.90	8.05½			
15	Washington . . .	. .	. .	15.4	. .	. .	7 31 15.38	—4.75½					
16	Mars . . . S.F.	. .	. .	50.3	. .	. .	7 31 50.28	+3.31½	34.90	8.07			
17	Washington . . .	. .	. .	43.5	. .	. .	7 33 43.48	—4.86					
18	Mars . . . N.P.	. .	. .	17.0	. .	. .	7 34 16.98	+4.07	33.50	8.93			
19	Washington . . .	. .	. .	45.6	. .	. .	7 36 45.58	—4.96					
20	Mars . . . N.P.	. .	. .	19.0	. .	. .	7 37 18.98	+4.04½	33.40	9.00½			
21	Washington . . .	. .	. .	41.0	. .	. .	7 40 40.98	—4.97					
22	Mars . . . S.F.	. .	. .	15.0	. .	. .	7 41 14.98	+3.30	34.00	8.27			
23	Washington . . .	. .	. .	34.4	. .	. .	7 45 34.38	—5.00½					
24	Mars . . . N.P.	. .	. .	7.0	. .	. .	7 46 6.98	+4.06½	32.60	9.07			
25	Washington . . .	. .	. .	57.7	. .	. .	7 47 57.68	—5.03					
26	Mars . . . S.F.	. .	. .	30.5	. .	. .	7 48 30.48	+3.23	+32.80	+8.26			

JANUARY 29, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
27	Washington . . .	. .	. .	2.2	. .	. .	7 50 2.18	−5.07			28.050	64.0	53.7
28	Mars . . . N.P.	. .	. .	33.6	. .	. .	7 50 33.58	+4.12	+31.40	+9.19			
29	Washington . . .	. .	. .	31.6	. .	. .	7 52 31.58	−5.05			Ther. att. 68°.7		
30	Mars . . . S.F.	. .	. .	5.2	. .	. .	7 53 5.18	+3.32	33.60	8.37	Bar. red. to 32° F. 27.940		
31	Washington . . .	. .	. .	40.3	. .	. .	7 56 40.28	−5.17					
32	Mars . . . N.P.	. .	. .	14.0	. .	. .	7 57 13.98	+4.04	33.70	9.21			
33	Washington . . .	. .	. .	55.5	. .	. .	8 0 55.48	−5.17					
34	Mars . . . S.F.	. .	. .	28.2	. .	. .	8 1 28.18	+3.34	32.70	8.51			
35	Washington . . .	. .	. .	52.7	. .	. .	8 2 52.68	−5.09½					
36	Mars . . . N.P.	. .	. .	24.7	. .	. .	8 3 24.68	+4.18	32.00	9.27½			
37	Washington . . .	. .	. .	9.6	. .	. .	8 5 9.58	−5.05½					
38	Mars . . . S.F.	. .	. .	42.5	. .	. .	8 5 42.48	+3.40½	32.90	8.46			
39	Washington . . .	. .	. .	46.3	. .	. .	8 7 46.28	−5.05					
40	Mars . . . N.P.	. .	. .	17.0	. .	. .	8 8 16.98	+4.28	30.70	9.33			
41	Washington . . .	. .	. .	46.5	. .	. .	8 10 46.48	−5.43½					
42	Mars . . . S.F.	. .	. .	18.3	. .	. .	8 11 18.28	+3.13	31.80	8.56½			
43	Washington . . .	. .	. .	28.2	. .	. .	8 13 28.18	−5.40½					
44	Mars . . . N.P.	. .	. .	59.0	. .	. .	8 13 58.98	+3.98	30.80	9.38½			
45	Washington . . .	. .	. .	29.6	. .	. .	8 15 29.58	−5.40					
46	Mars . . . S F.	. .	. .	1.6	. .	. .	8 16 1.58	+3.25	32.00	8.65			
47	Washington . . .	. .	. .	3.6	. .	. .	8 17 3.58	−5.35½					
48	Mars . . . N.P.	. .	. .	34.0	. .	. .	8 17 33.98	+4.07½	30.40	9.43			
49	Washington . . .	. .	. .	19.0	. .	. .	8 19 18.98	−5.32½					
50	Mars . . . S.F.	. .	. .	50.5	. .	. .	8 19 50.48	+3.29½	31.50	8.62			
51	Washington . . .	. .	. .	33.2	. .	. .	8 21 33.18	−5.29½					
52 b	Mars . . . N.F.	. .	. .	3.5	. .	. .	8 22 3.48	+3.39	30.30	8.68½			
53	Washington . . .	. .	. .	19.5	. .	. .	8 24 19.48	−5.24					
54	Mars . . . S.F.	. .	. .	50.6	. .	. .	8 24 50.58	+3.47	31.10	8.71			
55	Washington . . .	. .	. .	9.0	. .	. .	8 26 8.98	−5.23					
56	Mars . . . N.P.	. .	. .	38.5	. .	. .	8 26 38.48	+4.37	29.50	9.60			
57	Washington . . .	. .	. .	50.4	. .	. .	8 29 50.38	−5.12½					
58	Mars . . . S.F.	. .	. .	21.0	. .	. .	8 30 20.98	+3.69½	30.60	8.82			
59	Washington . . .	. .	. .	32.2	. .	. .	8 31 32.18	−5.07½					
60	Mars . . . N.P.	. .	. .	1.5	. .	. .	8 32 1.48	+4.51½	29.30	9.59			
61	Washington . . .	. .	. .	55.0	. .	. .	8 36 54.98	−4.90					
62	Mars . . . S.F.	. .	. .	24.7	. .	. .	8 37 24.68	+3.97½	29.70	8.87½			
63	Washington . . .	. .	. .	44.3	. .	. .	8 39 44.28	−4.83					
64	Mars . . . N.P.	. .	. .	12.9	. .	. .	8 40 12.88	+4.84	28.60	9.67			
65	Washington . . .	. .	. .	32.5	. .	. .	8 41 32.48	−4.77½					
66	Mars . . . S.F.	. .	.	2.2	. .	. .	8 42 2.18	+4.15	29.70	8.92½			
67	Washington . . .	. .	. .	57.6	. .	. .	8 43 57.58	−4.69½					
68	Mars . . . N.P.	. .	. .	26.0	. .	. .	8 44 25.98	+5.05	28.40	9.74½			
69	Washington . . .	. .	. .	9.1	. .	. .	8 46 9.08	−4.64					
70	Mars . . . S.F.	. .	. .	38.0	. .	. .	8 46 37.98	+4.33	28.90	8.97			
71	Washington . . .	. .	. .	50.5	. .	. .	8 47 50.48	−4.61					
72	Mars . . . N.P.	. .	. .	18.6	. .	. .	8 48 18.58	+5.22	+28.10	+9.83			

JANUARY 29, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
73	Washington . . .	. .	. .	32.2	. .	. .	8 49 32.18	—4.55½			28.037	60.1	52.8
74	Mars . . . S.F.	. .	. .	1.3	. .	. .	8 50 1.28	+4.51	+29.10	+9.06½			
75	Washington . . .	. .	. .	23.2	. .	. .	8 51 23.18	—4.42			Ther. att. 67°.7		
76	Mars . . . N.P.	. .	. .	51.5	. .	. .	8 51 51.48	+5.38	28.30	9.80	Bar. red. to 32° F. 27.930		
77	Washington . . .	. .	. .	5.2	. .	. .	8 53 5.18	—4.40					
78	Mars . . . S.F.	. .	. .	34.0	. .	. .	8 53 33.98	+4.67	28.80	9.07			
79	Washington . . .	. .	. .	50.5	. .	. .	8 54 50.48	—4.31					
80	Mars . . . N.P.	. .	. .	18.4	. .	. .	8 55 18.38	+5.59	+27.90	+9.90			

Remarks.

Night as fine as the preceding. The star is near 20*s*. in error to the eastward, and, being not more than a 11½ or 10th magnitude, it is so nearly occulted under the wire, that its transits are little better than guesses. After 20 measures, put in power 150, and was able to see it better, with the same light. The interval of transits is, however, so short, that the measures are not very satisfactory.

a Recorded 24*m*. *b* Rejected.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Twenty transits	8 6 0.30	+32.390	+8.503	=2 45.72
Mean N. P.	Nineteen transits	8 8 2.97	+31.120	+9.331	=3 1.86

	m. s.		h. m. s.
Correction for chronometer at 8 h. 6 m.	—3 19.65	Santiago sid. time S. F.	8 2 40.65
Correction for chronometer at 8 h. 8 m.	—3 19.65	Santiago sid. time N. P.	8 4 43.32
		Interval	2 2.67

	″		″
Δ P. F. limbs in A. R. reduced to arc	19.05	Δ N. S. limbs micr. in rev.	0.828 = 16.14
Variation of A. R. in 2*m*. 3*s*.	— 2.09	Variation of declination in 2*m*. 3*s*.	— 0.44
Observed P. F. diameter	16.96	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.50

	″		″
Δ ρ at 8 h. 2 m.	0.16	Δ ρ at 8 h. 4 m.	0.17

JANUARY 30, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	. .	18.2	. .	. .	7 14 18.18	+3.12			28.034	57.8	53.9
2	Washington . . .	. .	. .	41.5	. .	. .	7 14 41.48	—3.62	—23.30	+6.74			
3	Mars . . . N.P.	. .	. .	59.7	. .	. .	7 17 59.68	+3.63			Ther. att. 68°.0		
4	Washington . . .	. .	. .	23.7	. .	. .	7 18 23.68	—3.77½	24.00	7.40½	Bar. red. to 32° F. 27.927		
5	Mars . . . S.F.	. .	. .	10.0	. .	. .	7 21 9.98	+2.79					
6	Washington . . .	. .	. .	33.5	. .	. .	7 21 33.48	—3.87½	23.50	6.66½			
7	Mars . . . N.P.	. .	. .	38.0	. .	. .	7 23 37.98	+3.53½					
8	Washington . . .	. .	. .	53.5	. .	. .	7 23 53.48	—3.86½	— 25.50	+7.40			

JANUARY 30, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
9	Mars . . . S.F.	. .	. .	57.6	. .	. .	7 24 57.58	+2.74			28.034	57.8	53.9
10	Washington . . .	. .	. .	21.5	. .	. .	7 25 21.48	—4.15	—23.90	+6.89			
11	Mars . . . N.P.	. .	. .	34.0	. .	. .	7 27 33.98	+3.51			Ther. att 68°.0		
12	Washington . . .	. .	. .	59.0	. .	. .	7 27 58.98	—4.05½	25.00	7.56½	Bar. red. to 32° F. 27.927		
13	Mars . . . S.F.	. .	. .	27.0	. .	. .	7 31 26.98	+2.59					
14	Washington . . .	. .	. .	51.5	. .	. .	7 31 51.48	—4.11	24.50	6.70			
15	Mars . . . N.P.	. .	37.6	. .	. .	. .	7 33 50.51	+3.32½					
16	Washington . . .	. .	. .	16.0	. .	. .	7 34 15.98	—4.28	25.47	7.60½			
17	Mars . . . S.F.	. .	39.0	. .	. .	. .	7 35 51.91	+2.33½					
18	Washington . . .	. .	. .	18.3	. .	. .	7 36 18.28	—4.38	26.37	6.71½			
19	Mars . . . N.P.	. .	52.9	. .	. .	. .	7 38 5.81	+3.35					
20	Washington . . .	. .	. .	32.0	. .	. .	7 38 31.98	—4.32	26.17	7.67			
21	Mars . . . S.F.	. .	32.5	. .	. .	. .	7 40 45.41	+2.51					
22	Washington . . .	. .	. .	10.5	. .	. .	7 41 10.48	—4.38	25.07	6.89			
23	Mars . . . N.P.	. .	16.4	. .	. .	. .	7 42 29.31	+3.32					
24	Washington . . .	. .	. .	56.0	. .	. .	7 42 55.98	—4.45	26.67	7.77			
25	Mars . . . S.F.	. .	23.6	. .	. .	. .	7 44 36.51	+2.52½					
26	Washington . . .	. .	. .	3.0	. .	. .	7 45 2.98	—4.46½	26.47	6.99			
27	Mars . . . N.P.	. .	18.0	. .	. .	. .	7 47 30.91	+3.30½					
28	Washington . . .	. .	. .	58.0	. .	. .	7 47 57.98	—4.51	27.07	7.81½			
29	Mars . . . S.F.	. .	4.2	. .	. .	. .	7 49 17.11	+2.46½					
30	Washington . . .	. .	. .	43.5	. .	. .	7 49 43.48	—4.52	26.37	6.98½			
31	Mars . . . N.P.	. .	44.0	. .	. .	. .	7 50 56.91	+3.33½					
32	Washington . . .	. .	. .	24.2	. .	. .	7 51 24.18	—4.50½	27.27	7.84			
33	Mars . . . S.F.	. .	42.0	. .	. .	. .	7 52 54.91	+2.51					
34	Washington . . .	. .	. .	21.0	. .	. .	7 53 20.98	—4.52	26.07	7.03			
35	Mars . . . N.P.	. .	0.0	. .	. .	. .	7 55 12.91	+3.40					
36	Washington . . .	. .	. .	40.2	. .	. .	7 55 40.18	—4.56	27.27	7.96			
37	Mars . . . S.F.	. .	53.5	. .	. .	. .	7 59 6.41	+2.04					
38	Washington . . .	. .	. .	33.0	. .	. .	7 59 32.98	−5.11	26.57	7.15			
39	Mars . . . N.P.	. .	54.6	. .	. .	. .	8 1 7.51	+2.91					
40	Washington . . .	. .	. .	35.6	. .	. .	8 1 35.58	—5.08	28.07	7.99			
41	Mars . . . S.F.	. .	48.7	. .	. .	. .	8 4 1.61	+2.12					
42	Washington . . .	. .	. .	28.4	. .	. .	8 4 28.38	—5.14½	26.77	7.26½			
43	Mars . . . N.P.	. .	39.8	. .	. .	. .	8 5 52.71	+2.99					
44	Washington . . .	. .	. .	21.0	. .	. .	8 6 20.98	—5.12½	28.27	8.11½			
45	Mars . . . S.F.	. .	23.6	. .	. .	. .	8 11 36.51	+3.01½					
46	Washington . . .	. .	. .	4.2	. .	. .	8 12 4.18	—4.34	27.67	7.35½			
47	Mars . . . N.P.	. .	. .	29.5	. .	. .	8 13 29.48	+3.82					
48	Washington . . .	. .	. .	58.0	. .	. .	8 13 57.98	—4.23	28.50	8.05			
49	Mars . . . S.F.	. .	. .	9.5	. .	. .	8 17 9.48	+3.12½					
50	Washington . . .	. .	. .	37.5	. .	. .	8 17 37.48	—4.20½	28.00	7.33			
51	Mars . . . N.P.	. .	. .	56.4	. .	. .	8 18 56.38	+4.00					
52	Washington . . .	. .	. .	25.2	. .	. .	8 19 25.18	—4.17½	28.80	8.17½			
53	Mars . . . S.F.	. .	. .	59.4	. .	. .	8 20 59.38	+3.24½					
54	Washington . . .	. .	. .	28.4	. .	. .	8 21 28.38	—4.18	—29.00	+7.42½			

JANUARY 30, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
55	Mars . . . N.P.	. .	. .	39.0	. .	. .	8 22 38.98	+3.99			28.031	56.0	53.3
56	Washington . . .	. .	. .	8.2	. .	. .	8 23 8.18	−4.17	−29.20	+8.16			
57	Mars . . . S.F.	. .	. .	39.4	. .	. .	8 24 39.38	+3.26			Ther. att. 66°.8		
58	Washington . . .	. .	. .	7.5	. .	. .	8 25 7.48	−4.14½	28.10	7.40½	Bar. red. to 32° F. 27.927		
59	Mars . . . N.P.	. .	. .	26.6	. .	. .	8 26 26.58	+4.17					
60	Washington . . .	. .	. .	56.3	. .	. .	8 26 56.28	−4.11	29.70	8.28			
61	Mars . . . S.F.	. .	. .	12.9	. .	. .	8 29 12.88	+3.43					
62	Washington . . .	. .	. .	41.4	. .	. .	8 29 41.38	−4.07	28.50	7.50			
63	Mars . . . N.P.	. .	. .	23.6	. .	. .	8 31 23.58	+4.26					
64	Washington . . .	. .	. .	53.5	. .	. .	8 31 53.48	−3.96	29.90	8.22			
65	Mars . . . S.F.	. .	. .	56.2	. .	. .	8 33 56.18	+3.61½					
66	Washington . . .	. .	. .	25.2	. .	. .	8 34 25.18	−3.91½	29.00	7.53			
67	Mars . . . N.P.	. .	. .	34.3	. .	. .	8 35 34.28	+4.48					
68	Washington . . .	. .	. .	4.6	. .	. .	8 36 4.58	−3.80½	30.30	8.28½			
69	Mars . . . S.F.	. .	. .	11.0	. .	. .	8 37 10.98	+3.73					
70	Washington . . .	. .	. .	40.5	. .	. .	8 37 40.48	−3.81	29.50	7.54			
71	Mars . . . N.P.	. .	. .	44.6	. .	. .	8 38 44.58	+4.58					
72	Washington . . .	. .	. .	15.0	. .	. .	8 39 14.98	−3.72½	30.40	8.30½			
73	Mars . . . S.F.	. .	. .	33.4	. .	. .	8 40 33.38	+3.88½					
74	Washington . . .	. .	. .	2.5	. .	. .	8 41 2.48	−3.63	29.10	7.51½			
75	Mars . . . N.P.	. .	. .	3.5	. .	. .	8 43 3.48	+4.80					
76	Washington . . .	. .	. .	34.2	. .	. .	8 43 34.18	−3.70	30.70	8.50			
77	Mars . . . S.F.	. .	. .	41.0	. .	. .	8 45 40.98	+4.06					
78	Washington . . .	. .	. .	10.6	. .	. .	8 46 10.58	−3.46	29.60	7.52			
79	Mars . . . N.P.	. .	. .	42.4	. .	. .	8 47 42.38	+5.03					
80	Washington . . .	. .	. .	13.3	. .	. .	8 48 13.28	−3.41	30.90	8.44			
81	Mars . . . S.F.	. .	. .	1.5	. .	. .	8 51 1.48	+4.38					
82	Washington . . .	. .	. .	31.5	. .	. .	8 51 31.48	−3.38	30.00	7.76			
83	Mars . . . N.P.	. .	. .	41.5	. .	. .	8 52 41.48	+5.27½					
84	Washington . . .	. .	. .	13.3	. .	. .	8 53 13.28	−3.25½	31.80	8.53			
85	Mars . . . S.F.	. .	. .	23.5	. .	. .	8 54 23.48	+4.54½					
86	Washington . . .	. .	. .	54.2	. .	. .	8 54 54.18	−3.22	30.70	7.76½			
87	Mars . . . N.P.	. .	. .	24.6	. .	. .	8 56 24.58	+5.49					
88	Washington . . .	. .	. .	56.5	. .	. .	8 56 56.48	−2.98	31.90	8.47			
89	Mars . . . S.F.	. .	. .	1.7	. .	. .	8 59 1.68	+4.81					
90	Washington . . .	. .	. .	33.0	. .	. .	8 59 32.98	−2.89	31.30	7.70			
91	Mars . . . N.P.	. .	. .	53.6	. .	. .	9 0 53.58	+5.74					
92	Washington . . .	. .	. .	26.0	. .	. .	9 1 25.98	−2.78	32.40	8.52			
93	Mars . . . S.F.	. .	. .	0.2	. .	. .	9 3 0.18	+4.98½					
94	Washington . . .	. .	. .	31.8	. .	. .	9 3 31.78	−2.85	31.60	7.83½			
95	Mars . . . N.P.	. .	. .	46.0	. .	. .	9 4 45.98	+5.91					
96	Washington . . .	. .	. .	18.5	. .	. .	9 5 18.48	−2.59	32.50	8.50			
97	Mars . . . S.F.	. .	. .	9.7	. .	. .	9 7 9.68	+5.25					
98	Washington . . .	. .	. .	41.2	. .	. .	9 7 41.18	−2.64	31.50	7.89			
99	Mars . . . N.P.	. .	. .	59.8	. .	. .	9 8 59.78	+6.70½					
100	Washington . . .	. .	. .	32.9	. .	. .	9 9 32.38	−1.92	−33.10	+8.62½			

JANUARY 30, 1852—Continued.

Remarks.

Fine night. Any magnifying power may be used. Comparing star not brighter than 12½, or perhaps 11 magnitude, and so dim under light that a large number of the measures are doubtful. Many were made with no other light than that thrown into the field by the planet.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F.	Twenty-five transits	8 13 21.70	— 27.698	+ 7.284	= 2 21.96
Mean N. P.	Twenty-five transits	8 15 26.53	— 28.834	+ 8.088	= 2 37.63

	m. s.		h. m. s.
Correction for chronometer at 8 13 (h. m.)	— 3 22.01	Santiago sid. time S. F.	8 9 59.69
Correction for chronometer at 8 15	— 3 22.01	Santiago sid. time N. P.	8 12 4.52
		Interval	2 4.83

	″		″
Δ P. F. limbs in A. R. reduced to arc	17.04	Δ N. S. limbs micr. in rev.	0.804 = 15.67
Variation of A. R. in 2*m*. 5*s*.	+ 2.11	Variation of declination in 2*m*. 5*s*.	— 0.43
Observed P. F. diameter	14.93	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.04

	″		″
Δ ρ at 8 10 (h. m.)	0.13	Δ ρ at 8 12 (h. m.)	0.15

JANUARY 31, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	56.2	9.2	22.3	35.0	48.0	7 10 22.14	−6.92			28.026	64.4	55.6
2	Washington . . .	0.0	12.0	25.0	37.8	51.0	7 12 25.16	+2.39	−2 3.02	−9.31			
3	Mars . . . N.P.	54.5	7.5	20.4	33.2	46.1	7 17 20.34	−6.40			Ther. att. 70°.6 Bar. red. to 32° F. 27.912		
4	Washington . . .	58.5	11.5	24.5	37.4	50.5	7 19 24.48	+2.15	2 4.14	8.55			
5	Mars . . . S.F.	35.2	48.2	1.1	14.0	27.0	7 22 1.10	−7.31					
6	Washington . . .	38.5	51.5	4.5	. .	30.5	7 24 4.47	+2.04	2 3.37	9.35			
7	Mars . . . N.P.	31.0	44.0	56.8	9.7	22.8	7 26 56.86	−3.80½					
8	Washington . . .	36.0	48.7	. .	14.6	27.6	7 29 1.72	+4.65½	2 4.86	8.46			
9	Mars . . . S.F.	10.0	23.0	35.8	48.8	1.8	7 31 35.88	−4.69					
10	Washington . . .	14.5	27.3	40.2	53.0	6.0	7 33 40.20	+4.59	2 4.32	9.28			
11	Mars . . . N.P.	6.0	18.8	31.9	44.6	57.7	7 35 31.80	−3.91					
12	Washington . .	11.5	24.3	37.3	50.3	3.5	7 37 37.38	+4.54½	2 5.58	8.45½			
13	Mars . . . S.F.	14.1	27.0	40.0	52.8	6.0	7 39 39.98	−4.71					
14	Washington . . .	18.5	31.5	44.4	57.5	10.5	7 41 44.46	+4.47	2 4.48	9.18			
15	Mars . . . N.P.	13.5	26.5	39.5	52.3	5.4	7 44 39.44	−3.88½					
16	Washington . . .	19.7	31.6	45.7	58.5	11.5	7 46 45.40	+4.41	2 5.96	8.29½			
17	Mars . . . S.F.	38.8	51.8	4.7	17.6	30.6	7 49 4.70	−4.70					
18	Washington . . .	44.2	57.3	10.3	23.3	36.3	7 51 10.28	+4.36	2 5.58	9.06			
19	Mars . . . N.P.	41.0	54.0	6.8	19.7	33.0	7 53 6.90	−3.87½					
20	Washington . . .	47.4	0.6	13.7	26.7	39.6	7 55 13.60	+4.38	2 6.70	8.25½			
21	Mars . . . S.F.	34.4	47.4	0.5	13.3	26.4	7 58 0.40	−4.59½					
22	Washington . . .	40.5	53.3	6.4	19.3	32.3	8 0 6.36	+4.41	2 5.96	9.00½			
23	Mars . . . N.P.	30.3	42.3	56.0	9.0	22.1	8 1 56.12	−3.72					
24	Washington . . .	37.8	51.0	3.7	16.6	29.7	8 4 3.76	+4.49	2 7.64	8.21			
25	Mars . . . S.F.	37.7	50.6	3.5	16.4	29.5	8 6 3.54	−4.43					
26	Washington . . .	44.0	57.0	9.9	23.0	35.8	8 8 9.94	+4.52	2 6.40	8.95			
27	Mars . . . N.P.	41.5	54.5	7.3	20.0	33.2	8 10 7.30	−3.63					
28	Washington . . .	48.0	1.2	14.2	27.0	40.2	8 12 14.12	+4.47½	−2 6.82	−8.10½			

JANUARY 31, 1851—Continued.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
29	Mars . . . S.F.	32.0	45.0	57.9	10.8	23.8	8 16 57.90	—4.42½			27.983	62.0	53.6
30	Washington . . .	39.0	52.1	5.0	17.8	31.0	8 19 4.98	+4.41	—2 7.08	—8.83½			
31	Mars . . . N.P.	38.6	51.7	4.6	17.7	30.7	8 21 4.66	—3.48			Ther. att. 69°.5 Bar. red. to 32° F. 27.872		
32	Washington . . .	47.5	0.5	13.3	26.3	39.3	8 23 13.38	+4.47	2 8.72	7.95			
33	Mars . . . S.F.	1.7	14.7	27.5	40.4	53.5	8 26 27.56	—4.13					
34	Washington . . .	9.5	22.5	35.4	48.5	1.5	8 28 35.48	+4.60	2 7.92	8.73			
35	Mars . . . N.P.	4.0	17.2	29.8	42.8	56.0	8 30 29.96	—3.13					
36	Washington . . .	13.3	26.2	39.3	52.3	5.3	8 32 39.28	+4.71	2 9.32	7.84			
37	Mars . . . S.F.	5.2	18.3	31.0	44.1	57.2	8 35 31.16	—3.75					
38	Washington . . .	. .	27.0	39.8	52.8	5.7	8 37 39.83	+4.88	2 8.67	8.63			
39	Mars . . . N.P.	12.7	25.6	38.5	51.4	4.5	8 39 38.54	—2.79					
40	Washington . . .	22.6	35.5	48.4	1.4	14.5	8 41 48.48	+5.01½	2 9.94	7.80½			
41	Mars . . . S.F.	47.2	0.2	13.3	26.0	39.2	8 44 13.18	—3.35					
42	Washington . . .	56.5	9.3	22.3	35.1	48.2	8 46 22.28	+5.17½	2 9.10	8.52½			
43	Mars . . . N.P.	5.7	18.6	31.5	44.5	57.5	8 49 31.56	—2.36½					
44	Washington . . .	16.5	29.4	42.4	55.4	8.4	8 51 42.42	+5.33	2 10.86	7.69½			
45	Mars . . . S.F.	27.9	41.0	53.8	6.6	19.7	8 53 53.80	—4.71					
46	Washington . . .	37.5	50.7	3.7	16.6	29.5	8 56 3.60	+3.68½	2 9.80	8.39½			
47	Mars . . . N.P.	0.9	13.9	26.7	39.5	52.5	8 58 26.70	—3.67					
48	Washington . . .	12.0	25.1	37.8	50.8	4.0	9 0 37.94	+3.96½	2 11.24	7.63½			
49	Mars . . . S.F.	40.5	53.5	6.3	19.3	32.5	9 7 6.42	—6.64					
50	Washington . . .	51.0	4.0	17.0	30.0	43.0	9 9 17.00	+1.61	2 10.58	8.25			
51	Mars . . . N.P.	47.7	0.6	13.7	26.6	39.7	9 11 13.66	—5.52					
52	Washington . . .	0.1	13.0	25.8	38.6	52.0	9 13 25.90	+1.91	—2 12.24	—7.43			

Remarks.

Another splendid night. Images excellent, instruments steady, and measures satisfactory; the only drawback being, that the star is so small that a higher magnifying power than 150 cannot be used and sufficient light retained. It is certainly not brighter than a 11½ or 10th magnitude. Although differing considerably from the Ephemeris, it must be the star intended; for the only other in the vicinity is a 12th magnitude, which follows 49.15*s.*, and is 1.16 rev. (=22″.61) north.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Thirteen transits . .	8 7 45.98	—2 6.637	—8.888 . . .	=2 53.23
Mean N. P.	Thirteen transits . .	8 12 18.76	—2 8.001	—8.053 . . .	=2 36.95

	h. m.	m. s.
Correction for chronometer at	8 8	—3 24.65
Correction for chronometer at	8 12	—3 24.66

	h. m. s.
Santiago sid. time S. F.	8 4 21.33
Santiago sid time N. P.	8 8 54.10
Interval	4 32.77

	″
Δ P. F. limbs in A. R. reduced to arc . . .	20.46
Variation of A. R. in 4*m.* 33*s.*	— 4.54
Observed P. F. diameter	15.92

	″
Δ N. S. limbs micr. in rev. . . . . . 0.835 =	16.27
Variation of declination in 4*m.* 33*s* . .	— 0.89
Corr. for diam. of micr. wires . . .	2.20
Observed N. S. diameter	13.18

	h. m.	″
Δ ρ at	8 5	0.17
Δ ρ at	8 10	0.15

FEBRUARY 1, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . . 344	. .	. .	. .	. .	. .	. . . . .	± 0.00					
2 a	Mars . . . S.F.	. .	. .	48.5	. .	. .	6 44 48.48	—12.16	. .	—12.16	28.029	67.8	59.0
3	Bessel . . . 344	. .	. .	. .	. .	. .	. . . . .	± 0.00			Ther. att.		
4 a	Mars . . . N.P.	. .	. .	6.0	. .	. .	6 47 5.98	—11.32	. .	11.32	73°.1		
5	Bessel . . . 344	. .	. .	. .	. .	. .	. . . . .	± 0.00			Bar. red. to 32° F.		
6 a	Mars . . . S.F.	. .	. .	50.0	. .	. .	6 48 49.98	—12.16	. .	12.16	27.907		
7	Bessel . . . 344	. .	. .	24.0	. .	. .	6 50 23.98	± 0.00					
8	Mars . . . N.P.	. .	. .	28.0	. .	. .	6 50 27.98	—11.28	+4.00	11.28			
9	Bessel . . . 344	. .	. .	46.0	. .	. .	6 51 45.98	± 0.00					
10	Mars . . . S.F.	. .	. .	50.9	. .	. .	6 51 50.88	—12.05	4.90	12.05			
11	Bessel . . . 344	. .	. .	23.8	. .	. .	6 53 23.78	± 0.00					
12	Mars . . . N.P.	. .	. .	28.0	. .	. .	6 53 27.98	—11.25½	4.20	11.25½			
13	Bessel . . . 344	. .	. .	59.7	. .	. .	6 55 59.68	± 0.00					
14	Mars . . . S.F.	. .	. .	4.0	. .	. .	6 56 3.98	—12.13½	4.30	12.13½			
15	Bessel . . . 344	. .	. .	49.5	. .	. .	6 57 49.48	± 0.00					
16	Mars . . . N.P.	. .	. .	53.0	. .	. .	6 57 52.98	—11.18	3.50	11.18			
17	Bessel . . . 344	. .	. .	16.0	. .	. .	6 59 15.98	± 0.00					
18	Mars . . . S.F.	. .	. .	20.5	. .	. .	6 59 20.48	—12.02	4.50	12.02			
19	Bessel . . . 344	. .	. .	58.0	. .	. .	7 0 57.98	± 0.00					
20	Mars . . . N.P.	. .	. .	1.5	. .	. .	7 1 0.48	—11.22½	3.50	11.22½			
21	Bessel . . . 344	. .	. .	36.0	. .	. .	7 3 35.98	± 0.00					
22	Mars . . . S.F.	. .	. .	40.2	. .	. .	7 3 40.18	—12.01½	4.20	12.01½			
23	Bessel . . . 344	. .	. .	42.0	. .	. .	7 5 41.98	± 0.00					
24	Mars . . . N.P.	. .	. .	45.3	. .	. .	7 5 45.28	—11.08	3.30	11.08			
25	Bessel . . . 344	. .	. .	26.0	. .	. .	7 7 25.98	± 0.00					
26	Mars . . . N.P.	. .	. .	30.2	. .	. .	7 7 29.98	—11.13	4.20	11.13			
27	Bessel . . . 344	. .	. .	21.0	. .	. .	7 9 20.98	± 0.00					
28	Mars . . . N.P.	. .	. .	23.5	. .	. .	7 9 23.48	—11.13	2.50	11.13			
29	Bessel . . . 344	. .	. .	57.0	. .	. .	7 11 56.98	± 0.00					
30	Mars . . . S.F.	. .	. .	0.5	. .	. .	7 12 0.48	—11.86	3.50	11.86			
31	Bessel . . . 344	. .	. .	24.0	. .	. .	7 13 23.98	± 0.00					
32	Mars . . . S.F.	. .	. .	27.6	. .	. .	7 13 27.58	—11.90	3.60	11.90			
33	Bessel . . . 344	. .	. .	15.8	. .	. .	7 14 15.78	± 0.00					
34	Mars . . . S.F.	. .	. .	19.7	. .	. .	7 14 19.68	—11.90½	3.90	11.90½			
35	Bessel . . . 344	. .	. .	33.5	. .	. .	7 16 33.48	± 0.00					
36	Mars . . . N.P.	. .	. .	36.5	. .	. .	7 16 36.48	—11.00	3.00	11.00			
37	Bessel . . . 344	. .	. .	44.5	. .	. .	7 19 44.48	± 0.00					
38	Mars . . . S.F.	. .	. .	48.2	. .	. .	7 19 48.18	—11.81	3.70	11.81			
39	Bessel . . . 344	. .	. .	19.0	. .	. .	7 21 18.98	± 0.00					
40	Mars . . . N.P.	. .	. .	21.0	. .	. .	7 21 20.98	—10.98	2.00	10.98			
41	Bessel . . . 344	. .	. .	36.0	. .	. .	7 22 35.98	± 0.00					
42	Mars . . . S.F.	. .	. .	38.6	. .	. .	7 22 38.58	—11.84	2.60	11.84			
43	Bessel . . . 344	. .	. .	19.0	. .	. .	7 25 18.98	± 0.00					
44	Mars . . . N.P.	. .	. .	20.0	. .	. .	7 25 19.98	—10.97	1.00	10.97			
45	Bessel . . . 344	. .	. .	10.5	. .	. .	7 27 10.48	± 0.00					
46	Mars . . . S.F.	. .	. .	13.0	. .	. .	7 27 12.98	—11.66½	+2.50	—11.66½			

FEBRUARY 1, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α	Δ δ		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
47	Bessel . . . 344	. .	. .	18.0	. .	. .	7 29 17.98	± 0.00			28.014	66.6	55.5
48	Mars . . . N.P.	. .	. .	19.2	. .	. .	7 29 19.18	—10.99	+1.20	—10.99			
49	Bessel . . . 344	. .	. .	27.5	. .	. .	7 30 27.48	± 0.00			Ther. att. 73°.1		
50	Mars . . . S.F.	. .	. .	29.5	. .	. .	7 30 29.48	—11.75½	2.00	11.75½	Bar. red. to 32° F. 27.892		
51	Bessel . . . 344	. .	. .	12.1	. .	. .	7 32 12.08	± 0.00					
52	Mars . . . N.P.	. .	. .	13.2	. .	. .	7 32 13.18	—10.94½	1.10	10.94½			
53	Bessel . . . 344	. .	. .	39.0	. .	. .	7 33 38.98	± 0.00					
54	Mars . . . S.F.	. .	. .	41.6	. .	. .	7 33 41.58	—11.72	2.60	11.72			
55	Bessel . . . 344	. .	. .	24.0	. .	. .	7 35 23.98	± 0.00					
56	Mars . . . N.P.	. .	. .	24.8	. .	. .	7 35 24.78	—10.83½	0.80	10.83½			
57	Bessel . . . 344	. .	. .	5.0	. .	. .	7 37 4.98	± 0.00					
58	Mars . . . S.F.	. .	. .	6.8	. .	. .	7 37 6.78	—11.67½	1.80	11.67½			
59	Bessel . . . 344	. .	. .	31.0	. .	. .	7 38 30.98	± 0.00					
60	Mars . . . N.P.	. .	. .	31.5	. .	. .	7 38 31.48	—10.81½	0.50	10.81½			
61	Bessel . . . 344	. .	. .	56.0	. .	. .	7 39 55.98	± 0.00					
62	Mars . . . S.F.	. .	. .	57.5	. .	. .	7 39 57.48	—11.62½	+1.50	—11.62½			

Remarks.

There were two sharp earthquakes at an interval of 12*s.* about 6*h.* 12*m.* p. m., and their effect seems to have been to change the atmospheric condition. Planet and star are at one instant steady, and before half way across the field, blurred and jumping in a most extraordinary manner. The measures, therefore, could not have been very good, even had there not been the additional difficulty of endeavoring to keep Mars on the middle wire, with the tangent screw, whilst the micrometer wire was moved to bisect the star. Thus only one reading of the micrometer appears, the star being that number of revolutions to the north of the planets' limbs.

a The three preceding observations are not incorporated into the means.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F. . .	Fourteen transits . . .	7 17 15.59	+ 3.258	— 11.855	= 3 51.05
Mean N. P. . .	Fourteen transits . . .	7 18 5.30	+ 2.486	— 11.060	= 3 35.56

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 17 . . .	— 3 26.97	Santiago sid. time S. F.	7 13 48.62
Correction for chronometer at	7 18 . . .	— 3 26.97	Santiago sid. time N. P.	7 14 38.33
			Interval	49.71

	″		″
Δ P. F. limbs in A. R. reduced to arc . .	11.58	Δ N. S. limbs micr. in rev. . . . . 0.795 =	15.49
Variation of A. R. in 50*s.*	— 0.74	Variation of declination in 50*s.* . . .	— 0.02
Observed P. F. diameter	10.84	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.27

h. m.	″	h. m.	″
Δ ρ at 7 14	0.23	Δ ρ at 7 15	0.22

FEBRUARY 2, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	18.2	31.1	44.0	57.0	10.0	7 15 44.06	—2.36½			28.002	69.5	60.4
2	Bessel . . . 344	49.0	2.0	14.9	27.6	40.6	7 17 14.82	0.88	—1 30.76	—1.48½	Ther. att. 73°.7		
3	Mars . . . N.P.	43.5	56.4	9.4	22.3	35.3	7 19 9.38	3.10			Bar. red. to 32° F.		
4	Bessel . . . 344	15.5	28.4	41.5	54.3	7.2	7 20 41.38	—0.77	—1 32.00	—2.33	27.878		

FEBRUARY 2, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
5	Mars . . . S.F.	56.5	9.5	22.3	35.2	48.4	7 22 22.38	—2.25			28.002	69.5	60.4
6	Bessel . . . 344	27.6	40.6	53.4	6.4	19.2	7 23 53.44	0.73	—1 31.06	—1.52			
7	Mars . . . N.P.	29.5	42.5	. .	8.4	21.3	7 25 55.43	3.00			Ther. att. 73°.7		
8	Bessel . . . 344	1.6	14.8	28.0	40.8	53.6	7 27 27.76	0.65	1 32.33	2.35	Bar. red. to 32° F.		
9	Mars . . . S.F.	30.6	43.6	56.5	9.5	22.6	7 29 56.56	2.17			27.878		
10	Bessel . . . 344	2.5	15.4	28.2	41.0	54.0	7 31 28.22	0.60	1 31.66	1.57			
11	Mars . . . N.P.	50.8	3.7	16.6	29.5	42.5	7 33 16.62	2.99					
12	Bessel . . . 344	23.5	36.4	49.4	2.4	15.5	7 34 49.44	0.55½	1 32.82	2.43½			
13	Mars . . . S.F.	21.0	34.1	47.1	59.9	13.0	7 36 47.02	2.21					
14	Bessel . . . 344	53.0	6.0	19.0	32.0	45.0	7 38 19.00	0.51½	1 31.98	1.69½			
15	Mars . . . N.P.	43.6	56.5	9.6	22.5	35.5	7 40 9.54	2.98					
16	Bessel . . . 344	17.2	30.0	43.0	56.0	8.9	7 41 43.02	0.47½	1 33.48	2.50½			
17	Mars . . . S.F.	11.6	24.6	37.8	50.6	3.6	7 43 37.64	2.17					
18	Bessel . . . 344	44.5	57.4	10.4	23.3	36.2	7 45 10.36	0.43½	1 32.72	1.73½			
19	Mars . . . N.P.	37.0	50.3	3.0	16.0	29.0	7 48 3.06	2.97					
20	Bessel . . . 344	11.0	24.0	37.0	50.0	3.0	7 49 37.00	0.41	1 33.94	2.56			
21	Mars . . . S.F.	0.5	13.3	26.2	39.1	52.0	7 53 26.22	2.27½					
22	Bessel . . . 344	33.5	46.5	59.5	12.4	25.3	7 54 59.44	0.49½	1 33.22	1.78			
23	Mars . . . N.P.	15.5	28.5	41.5	54.5	7.5	7 56 41.50	3.18					
24	Bessel . . . 344	50.3	3.2	16.1	29.0	41.9	7 58 16.10	0.52	1 34.60	2.66			
25	Mars . . . S.F.	15.0	27.8	40.8	53.7	6.7	8 0 40.80	2.51½					
26	Bessel . . . 344	48.5	1.5	14.5	27.3	40.3	8 2 14.42	0.62	1 33.62	1.89½			
27	Mars . . . N.P.	17.5	30.5	43.5	56.4	9.3	8 4 43.44	3.41					
28	Bessel . . . 344	52.7	5.5	18.6	31.5	44.4	8 6 18.54	0.66	1 35.10	2.75			
29	Mars . . . S.F.	31.0	44.0	57.0	9.8	22.8	8 7 56.92	2.69½					
30	Bessel . . . 344	5.3	18.2	31.2	44.0	57.0	8 9 31.14	0.74½	1 34.22	1.95			
31	Mars . . . N.P.	46.5	59.5	12.5	25.3	38.3	8 11 12.42	3.56					
32	Bessel . . . 344	22.3	35.2	48.0	1.0	13.8	8 12 48.06	0.70	1 35.64	2.86			
33	Mars . . . S.F.	10.8	23.8	36.7	49.6	2.7	8 14 36.72	2.89½					
34	Bessel . . . 344	45.5	58.5	11.5	24.4	37.3	8 16 11.44	0.85	1 34.72	2.04½			
35	Mars . . . N.P.	9.0	22.0	35.1	47.9	1.0	8 20 35.00	3.90					
36	Bessel . . . 344	45.0	58.8	11.0	24.0	37.0	8 22 11.16	0.93	1 36.16	2.97			
37	Mars . . . S.F.	48.3	1.3	14.3	27.2	40.3	8 24 14.28	3.20					
38	Bessel . . . 344	23.5	36.5	49.6	2.5	15.5	8 25 49.52	1.03	1 35.24	2.17			
39	Mars . . . N.P.	23.2	36.2	49.1	2.2	15.2	8 27 49.18	4.08					
40	Bessel . . . 344	0.0	13.0	26.0	38.7	51.6	8 29 25.86	1.14½	1 36.68	2.93½			
41	Mars . . . S.F.	27.2	40.3	53.2	6.0	19.0	8 31 53.14	3.41					
42	Bessel . . . 344	3.0	16.0	29.0	42.0	54.8	8 33 28.96	1.23½	1 35.82	2.17½			
43	Mars . . . N.P.	44.7	57.6	10.6	23.5	36.5	8 35 10.58	4.35½					
44	Bessel . . . 344	22.0	35.1	47.9	0.8	13.6	8 36 47.88	1.33	1 37.30	3.02½			
45	Mars . . . S.F.	55.0	8.0	21.0	34.0	47.0	8 38 21.00	3.69					
46	Bessel . . . 344	31.2	44.2	57.2	10.1	23.0	8 39 57.14	1.43	1 36.14	2.26			
47 a	Mars . . . N.P.	9.8	22.7	35.9	48.8	1.7	8 41 35.78	4.64					
48	Bessel . . . 344	47.5	0.5	13.5	26.3	39.1	8 43 13.38	1.54	1 37.60	3.10			
49	Mars . . . S.F.	21.2	34.0	47.3	0.2	13.2	8 45 47.18	4.07½					
50	Bessel . . . 344	58.0	11.0	24.0	37.0	50.0	8 47 24.00	—1.75	—1 36.82	—2.32½			

FEBRUARY 2, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
51	Mars . . .	N.P.	9.2	22.2	35 2	48.0	1.0	8 49 35.12	—5.07½			27.989	67.4	59.2
52	Bessel . . .	344	47.2	0.3	13.0	26.0	39.0	8 51 13.10	1.97½	—1 37.98	—3.10			
53	Mars . . .	S.F.	56.0	9.0	22.0	35.0	48.0	8 55 22.00	2.81			Ther. att. 72°5.		
54	Bessel . .	344	33.5	46.4	59.5	12.4	25.4	8 56 56.44	0.44½	1 37.44	2.36½	Bar. red. to 32° F. 27.870		
55	Mars . . .	N.P.	23.5	36.4	49.5	2.4	15.5	8 58 49.46	3.55					
56	Bessel . . .	344	2.5	15.5	28.3	41.0	54.0	9 0 28.26	0.35	1 38.80	3.20			
57	Mars . . .	S.F.	15.5	28.6	41.6	54.5	7.5	9 2 41.54	3.08					
58	Bessel . . .	344	53.5	6.5	19.5	32.5	45.5	9 4 19.50	0.58	1 37.96	2.50			
59	Mars . . .	N.P.	49.5	2.5	15.5	28.5	41.5	9 6 15.50	4.08					
60	Bessel . . .	344	28.6	41.6	54.7	7.6	20.5	9 7 54.60	—0.78½	—1 39.10	—3.29½			

Remarks.

A fine night again. Objects a little wavy at times, but measures, with power 235, very satisfactory.

a Recorded 36.9*s*. at wire C.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Fifteen transits . . .	8 8 13.83	—1 34.225	—1.965	=0 38.30
Mean N. P. . .	Fifteen transits . . .	8 11 56.13	—1 35.569	—2.805	=0 54.67

	h. m.	m. s.		h. m. s.
Correction for chronometer at	8 8 . .	—3 30.18	Santiago sid. time S. F.	8 4 43.65
Correction for chronometer at	8 12 . .	—3 30.19	Santiago sid. time N. P.	8 8 25.94
			Interval	3 42.29

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	20.16	Δ N. S. limbs micr. in rev.	0.840 = 16.37
Variation of A. R. in 3*m*. 42*s*.	— 3.57	Variation of declination in 3*m*. 42*s*. . .	— 0.65
Observed P. F. diameter	16.59	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	13.52

h. m.	″	h. m.	″
Δ ρ at 8 5	0.04	Δ ρ at 8 9	0.05

FEBRUARY 3, 1852.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . .	S.F.	. .	. .	10.0	. .	. .	8 11 10.00	—2.05½			27.908	64.8	59.6
2	Washington . . .		. .	. .	. .	. .	.	. . . . .	3.39	. . .	+1.33½			
3	Mars . . .	N.P.	. .	. .	30.5	. .	. .	8 12 30.50	1.28			Ther. att. 71°.5		
4	Washington . . .		. .	. .	. .	. .	. .	. . . . .	3.43	. . .	2.15	Bar. red. to 32° F. 27.790		
5	Mars . . .	S.F.	. .	. .	38.6	. .	. .	8 14 38.60	2.01					
6	Washington . . .		. .	. .	. .	. .	. .	. . . . .	3.35	. . .	1.34			
7	Mars . . .	N.P.	. .	. .	4.7	. .	. .	8 21 4.70	1.04½					
8	Washington . . .		. .	. .	. .	. .	. .	. . . . .	3.23	. . .	2.18½			
9	Mars . . .	S.F.	. .	. .	51.6	. .	. .	8 22 51.60	1.72					
10	Washington . . .		. .	. .	. .	. .	. .	. . . . .	—3.17½	. . .	+1.45½			

FEBRUARY 3, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	Mars . . . N.P.	. .	. .	10.2	. .	. .	8 24 10.20	—2.62			27.908	64.8	59.6
12	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.93	. . .	+2.31			
13	Mars . . . S.F.	. .	. .	56.5	. .	. .	8 25 56.50	3.42			Ther. att. 71°.5		
14	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.88½	. . .	1.46½	Bar. red. to 32° F.		
15	Mars . . . N.P.	. .	. .	32.0	. .	. .	8 27 32.00	2.62			27.790		
16	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.87	. . .	2.25			
17	Mars . . . S.F.	. .	. .	2.0	. .	. .	8 29 2.00	3.34					
18	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.79½	. . .	1.45½			
19	Mars . . . N.P.	. .	. .	35.6	. .	. .	8 30 35.60	2.45½					
20	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.72	. . .	2.26½			
21	Mars . . . S.F.	. .	. .	18.0	. .	. .	8 33 18.00	3.14					
22	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.70	. . .	1.56			
23	Mars . . . N.P.	. .	. .	53.1	. .	. .	8 34 53.10	2.28					
24	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.61	. . .	2.33			
25	Mars . . . S.F.	. .	. .	21.0	. .	. .	8 36 21.00	3.02½					
26	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.56½	. . .	1.54			
27	Mars . . . N.P.	. .	. .	55.7	. .	. .	8 37 55.70	2.16					
28	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.52½	. . .	2.36½			
29	Mars . . . S.F.	. .	. .	20.5	. .	. .	8 40 20.50	2.89					
30	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.46½	. . .	1.57½			
31	Mars . . . N.P.	. .	. .	51.6	. .	. .	8 41 51.60	2.00					
32	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.36	. . .	2.36			
33	Mars . . . S.F.	. .	. .	11.3	. .	. .	8 43 11.30	2.69					
34	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.36½	. . .	1.67½			
35	Mars . . . N.P.	. .	. .	38.6	. .	. .	8 44 38.60	1.85½					
36	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.31	. . .	2.45½			
37	Mars . . . S.F.	. .	. .	0.5	. .	. .	8 46 0.50	2.58½					
38	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.17	. . .	1.58½			
39	Mars . . . N.P.	. .	. .	24.0	. .	. .	8 47 24.00	1.71					
40	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.14½	. . .	2.43½			
41	Mars . . . S.F.	. .	. .	21.0	. .	. .	8 49 21.00	2.40½					
42	Washington . . .	. .	. .	. .	. .	. .	. . . .	4.04½	. . .	1.64			
43	Mars . . . N.P.	. .	. .	44.0	. .	. .	8 50 44.00	1.51					
44	Washington . . .	. .	. .	. .	. .	. .	. . . .	3.94	. . .	2.43			
45	Mars . . . S.F.	. .	. .	57.7	. .	. .	8 51 57.70	2.21					
46	Washington . . .	. .	. .	. .	. .	. .	. . . .	3.91½	. . .	1.70½			
47	Mars . . . N.P.	. .	. .	11.5	. .	. .	8 53 11.50	1.40½					
48	Washington . . .	. .	. .	. .	. .	. .	. . . .	3.84½	. . .	2.44			
49	Mars . . . S.F.	. .	. .	40.3	. .	. .	8 54 40.30	2.06					
50	Washington . . .	. .	. .	. .	. .	. .	. . . .	3.78	. . .	1.72			
51	Mars . . . N.P.	. .	. .	48.2	. .	. .	8 56 48.20	1.25					
52	Washington . . .	. .	. .	. .	. .	. .	. . . .	3.78	. . .	2.53			
53	Mars . . . S.F.	. .	. .	32.0	. .	. .	8 57 32.00	1.93½					
54	Washington . . .	. .	. .	. .	. .	. .	. . . .	3.66	. . .	1.72½			
55	Mars . . . N.P.	. .	. .	58.8	. .	. .	8 59 58.80	1.05½					
56	Washington . . .	. .	. .	. .	. .	. .	. . . .	—3.62½	. . .	+2.57			

FEBRUARY 3, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
57	Mars . . . S.F.	. .	. .	40.2	. .	. .	9 1 40.20	—1.70			27.886	64.8	61.0
58	Washington . . .	. .	. .	. .	. .	. .	. . . . .	3.57	. . .	+1.87	Ther. att. 70°.2		
59	Mars . . . N.P.	. .	. .	33.3	. .	. .	9 3 33.30	0.94½			Bar. red.		
60	Washington . . .	. .	. .	. .	. .	. .	. . . . .	—3.56½	. . .	+2.62	to 32° F. 27.773		

Remarks.

Cirro stratus all over the heavens. Both planet and star indistinct and unsteady, though able to use power 235. The small difference A. R. prevented the time of the star's transit being observed without risking the declination measure on the border of the field.

Results.

			h. m. s.
Mean S. F. . . .	Fifteen transits . . .		8 38 32.48
Mean N. P. . . .	Fifteen transits . . .		8 40 27.45
	h. m.		m. s.
Correction for chronometer at	8 39 . . .		— 3 34.22
Correction for chronometer at	8 40 . . .		— 3 34.22
			″
Δ N. S. limbs micr. in rev.		0.804 =	15.70
Variation of declination in 1*m.* 55*s.* . . .			— 0.31
Corr. for diam. of micr. wires			— 2.20
Observed N. S. diameter			13.19

	Rev.	′ ″
. . . .	+ 1.576	= 0 30.72
. . . .	+ 2.380	= 0 46.39

	h. m. s.
Santiago sid. time S. F.	8 34 58.26
Santiago sid. time N. P.	8 36 53.23
Interval	1 54.97
h. m.	″
Δ ρ at 8 35	0.03
Δ ρ at 8 37	0.05

FEBRUARY 4, 1852.

The sky was too much obscured by thin cirri to permit the comparing star (H. C. 16337) to be seen even without any light; nor could I find a star in A. R. 8*h.* 12*m.* 40*s.*, Dec. + 24° 32′ ±, which is on the map.

FEBRUARY 5, 1852.

Entirely obscured.

FEBRUARY 6, 1852.

Entirely obscured.

FEBRUARY 7, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 341	36.8	50.0	3.2	16.0	29.5	6 42 3.10	+5.03			27.872	71.4	64.2
2	Mars . . . S.F.	. .	54.5	7.2	20.3	33.5	6 43 7.38	—5.65	+1 4.28	—10.68			
3	Bessel . . . 341	54.5	7.5	20.6	33.6	. .	6 46 20.53	+4.85			Ther. att. 75°.9		
4	Mars . . . N.P.	57.0	10.2	23.1	36.0	49.1	6 47 23.08	—4.97	1 2.55	9.82	Bar. red. to 32° F. 27.742		
5	Bessel . . . 341	34.0	47.2	0.0	13.0	. .	6 52 0.03	+4.71					
6	Mars . . . S.F.	37.5	50.5	3.5	16.3	29.5	6 53 3.46	—5.94	+1 3.43	—10.65			

FEBRUARY 7, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
7	Bessel . . . 341	41.6	54.6	7.6	20.5	. .	6 59 7.55	+4.43½			27.872	71.4	64.2
8	Mars . . . N.P.	43.5	56.5	9.5	22.5	35.5	7 0 9.50	−5.42	+1 1.95	−9.85½			
9	Bessel . . . 341	14.6	27.6	40.7	. .	. .	7 2 40.59	+4.28			Ther. att. 75°.9		
10	Mars . . . S.F.	17.5	30.5	43.3	56.2	9.5	7 3 43.40	−6.34	1 2.81	10.62	Bar. red. to 32° F.		
11	Bessel . . . 341	55.0	8.2	21.2	. .	. .	7 6 21.09	+4.11½			27.742		
12	Mars . . . N.P.	56.7	9.6	22.8	35.6	48.5	7 7 22.64	−5.70	1 1.55	9.81½			
13	Bessel . . . 341	17.2	30.2	43.3	. .	. .	7 9 43.19	+4.03½					
14	Mars . . . S.F.	19.0	32.3	45.5	. .	11.5	7 10 45.31	−6.57	1 2.12	10.60½			
15	Bessel . . . 341	51.2	4.5	17.5	. .	. .	7 13 17.36	+3.97					
16	Mars . . . N P.	52.4	5.5	18.5	31.3	44.4	7 14 18.42	−5.81	1 1.06	9.78			
17 *a*	Bessel . . . 341	8.2	21.2	34.4	. .	. .	7 17 34.22	+3.90					
18	Mars . . . S.F.	10.2	23.3	36.3	49.2	2.5	7 18 36.30	−6.59	1 2.08	10.49			
19	Bessel . . . 341	. .	56.0	9.0	. .	. .	7 21 8.96	+3.80					
20	Mars . . . N.P.	43.7	56.8	9.8	22.8	35.8	7 22 9.78	−5.96	1 0.82	9.76			
21	Bessel . . . 341	3.5	17.0	30.0	. .	. .	7 25 29.79	+3.72					
22	Mars . . . S.F.	5.3	18.5	31.5	. .	57.8	7 26 31.50	−6.72	1 1.71	10.44			
23 *a*	Bessel . . . 341	. .	46.8	0.0	.	. .	7 28 59.87	+3.60					
24	Mars . . . N.P.	33.6	46.8	0.0	12.5	26.0	7 29 59.78	−5.93	0 59.91	9.53			
25	Bessel . . . 341	32.5	45.5	58.5	. .	. .	7 39 58.46	+3.48					
26	Mars . . . S.F.	33.5	46.3	59.0	12.2	25.0	7 40 59.20	−6.83½	1 0.74	10.31½			
27	Bessel . . . 341	44.5	57.6	10.6	. .	. .	7 43 10.52	+3.46					
28	Mars . . . N.P.	44.0	57.0	10.0	23.0	36.0	7 44 10.00	−6.08	0 59.48	9.54			
29	Bessel . . . 341	8.5	22.0	35.0	. .	. .	7 46 34.79	+3.42					
30	Mars . . . S.F.	9.0	22.0	35.0	48.0	1.0	7 47 35.00	−6.82½	1 0.21	10.24½			
31	Bessel . . . 341	55.0	8.2	21.0	. .	. .	7 52 21.02	+3.48½					
32	Mars . . . N.P.	53.5	7.0	20.0	32.8	46.0	7 53 19.86	−5.98	0 58.84	9.46½			
33	Bessel . . . 341	56.0	8.8	21.8	. .	. .	7 55 21.82	+3.55½					
34	Mars . . . S.F.	55.5	8.5	21.5	34.3	47.3	7 56 21.42	−6.68	0 59.60	10.23½			
35	Bessel . . . 341	43.2	56.4	9.4	. .	.	7 59 9.29	+3.55½					
36	Mars . . . N.P.	41.5	54.3	7.4	20.4	33.4	8 0 7.40	−5.91½	0 58.11	9.47			
37	Bessel . . . 341	32.5	45.3	58.3	. .	. .	8 2 58.32	+3.66½					
38	Mars . . . S.F.	31.3	44.5	57.5	. .	23.5	8 3 57.43	−6.59	0 59.11	10.25½			
39	Bessel . . . 341	8.2	21.0	34.0	. .	. .	8 6 34.02	+3.66					
40	Mars . . . N.P.	5.5	18.5	31.5	44.6	58.0	8 7 31.62	−5.70	0 57.60	9.36			
41	Bessel . . . 341	52.3	5.3	18.0	. .	. .	8 10 18.16	+3.74½					
42	Mars . . . S.F.	51.0	3.8	16.5	29.6	42.6	8 11 16.70	−6.36	0 58 54	10.10½			
43	Bessel . . . 341	41.5	54.3	7.3	. .	. .	8 14 7.32	+3.86					
44	Mars . . . N.P.	38.3	51.5	4.3	17.6	30.5	8 15 4.44	−5.53	0 57.12	9.39			
45	Bessel . . . 341	31.5	45.0	58.0	. .	. .	8 18 57.79	+3.93					
46	Mars . . . S.F.	29.8	43.0	55.6	. .	22.0	8 19 55.83	−6.19½	0 58.04	10.12½			
47	Bessel . . . 341	1.5	14.3	27.3	. .	. .	8 22 27.32	+4.02			27.846	67.0	63.6
48	Mars . . . N.P.	58.0	11.0	24.0	36.8	50.0	8 23 23.96	−5.22½	0 56.64	9.24½			
49	Bessel . . . 341	35.0	48.2	1.3	. .	. .	8 27 1.12	+4.21			Ther. att. 74°.8		
50	Mars . . . S.F.	33.2	46.0	59.0	12.0	25.0	8 27 59.04	−5.79	0 57.92	10.00	Bar. red. to 32° F.		
51 *a*	Bessel . . . 341	18.0	31.0	44.0	. .	. .	8 30 43.96	+4.32			27.720		
52	Mars . . . N.P.	14.5	27.0	40.5	. .	6.2	8 31 40.28	−4.96½	+0 56.32	−9.28½			

FEBRUARY 7, 1852—Continued.

Remarks.

Night unfavorable. After the hottest day (temp. 90°.7) yet experienced in Chile, a cold wind has set in, and the images have never been either sharp or steady. No measure is regarded as more than fair. With the first three, power 150 was used; afterwards 235, though with some difficulty. The observations marked *a* were much blurred and unsteady.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Thirteen transits	7 37 13.23	+1 0.815 . . .	—10.367	=3 22.05
Mean N. P. . .	Thirteen transits . . .	7 41 15.98	+0 59.381 . . .	— 9.563	=3 6.38

	m. s.		h. m. s.
Correction for chronometer at 7h 37m . . .	—3 47.17	Santiago sid. time S. F.	7 33 26.06
Correction for chronometer at 7h 41m . . .	—3 47.18	Santiago sid. time N. P.	7 37 28.80
		Interval	4 2.72

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	21.51	Δ N. S. limbs mic. in rev.	0.804=15.67
Variation of A. R. in 4*m*. 3*s*.	— 3.48	Variation of declination in 4*m*. 3*s*. . .	— 0.51
Observed P. F. diameter	18.03	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	12.96

	″		″
Δ ρ at 7h 33m	0.20	Δ ρ at 7h 37m	0.19

FEBRUARY 8, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	. .	9.0	. .	. .	6 43 8.98	+3.72½			27.890	66.6	60.4
2	Bessel . . . 341	. .	. .	28.6	. .	. .	6 43 28.58	5.52	—19.60	—1.79½			
3	Mars . . . N.P.	. .	. .	10.0	. .	. .	6 47 9.98	4.33			Ther. att. 72°.3 Bar. red. to 32° F. 27.770		
4	Bessel . . . 341	. .	. .	28.3	. .	. .	6 47 28.28	5.31	18.30	0.98			
5	Mars . . . S.F.	. .	. .	1.4	. .	. .	6 50 1.38	3.45					
6	Bessel . . . 341	. .	. .	20.0	. .	. .	6 50 19.98	5.19½	18.60	1.74½			
7	Mars . . . N.P.	. .	. .	41.7	. .	. .	6 51 41.68	4.37					
8	Bessel . . . 341	. .	. .	59.8	. .	. .	5 51 59.78	5.12	18.10	0.75			
9	Mars . . . S.F.	. .	. .	37.5	. .	. .	6 53 37.48	3.40½					
10	Bessel . . . 341	. .	. .	55.7	. .	. .	6 53 55.68	5.18½	18.20	1.78			
11	Mars . . . N.P.	. .	. .	15.9	. .	. .	6 55 15.88	4.17½					
12	Bessel . . . 341	. .	. .	35.3	. .	. .	6 55 35.28	5.08½	19.40	0.91			
13	Mars . . . S.F.	. .	. .	27.3	. .	. .	6 58 27.28	3.45					
14	Bessel . . . 341	. .	. .	45.8	. .	. .	6 58 45.78	5.11½	18.50	1.66½			
15	Mars . . . N.P.	. .	. .	56.5	. .	. .	6 59 56.48	4.13					
16	Bessel . . . 341	. .	. .	16.5	. .	. .	7 0 16.48	5.06	20.00	0.93			
17	Mars . . . S.F.	. .	. .	45.5	. .	. .	7 1 45.48	3.30					
18	Bessel . . . 341	. .	. .	4.4	. .	. .	7 2 4.38	5.05½	18.90	1.75½			
19	Mars . . . N.P.	. .	. .	26.1	. .	. .	7 3 26.08	4.21					
20	Bessel . . . 341	. .	. .	46.1	. .	. .	7 3 46.08	5.09½	20.00	0.88½			
21	Mars . . . S.F.	. .	. .	42.3	. .	. .	7 5 42.28	3.11					
22	Bessel . . . 341	. .	. .	1.2	. .	. .	7 6 1.18	4.82	18.90	1.71			
23	Mars . . . N.P.	. .	. .	27.8	. .	. .	7 7 27.78	3.89					
24	Bessel . . . 341	. .	. .	48.0	. .	. .	7 7 47.98	+4.77½	—20.20	—0.88½			

FEBRUARY 8, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
25	Mars . . . S.F.	. .	. .	23.5	. .	. .	7 9 23.48	+3.10					
26	Bessel . . . 341	. .	. .	43.0	. .	. .	7 9 42.98	4.66	—19.50	—1.56	27.890	66.6	60.4
27	Mars . . . N.P.	. .	. .	17.0	. .	. .	7 11 16.98	3.78			Ther. att. 72°.3 Bar. red. to 32° F. 27.770		
28	Bessel . . . 341	. .	. .	37.6	. .	. .	7 11 37.58	4.59	20.60	0.81			
29	Mars . . . S.F.	. .	. .	8.0	. .	. .	7 13 7.98	3.05					
30	Bessel . . . 341	. .	. .	27.3	. .	. .	7 13 27.28	4.69	19.30	1.64			
31	Mars . . . S.F.	. .	. .	7.2	. .	. .	7 20 7.18	2.89					
32	Bessel . . . 341	. .	. .	27.0	. .	. .	7 20 26.98	4.43½	19.80	1.54½			
33	Mars . . . N.P.	. .	. .	42.3	. .	. .	7 21 42.28	3.65					
34	Bessel . . . 341	. .	. .	3.5	. .	. .	7 22 3.48	4.47	21.20	0.82			
35	Mars . . . S.F.	. .	. .	1.9	. .	. .	7 24 1.88	2.88					
36	Bessel . . . 341	. .	. .	22.0	. .	. .	7 24 21.98	4.43	20.10	1.55			
37	Mars . . . N.P.	. .	. .	21.0	. .	. .	7 30 20.98	3.60					
38	Bessel . . . 341	. .	. .	42.5	. .	. .	7 30 42.48	4.31	21.50	0.71			
39	Mars . . . N.P.	. .	. .	12.0	. .	. .	7 32 11.98	3.57½					
40	Bessel . . . 341	. .	. .	33.5	. .	. .	7 32 33.48	4.25½	21.50	0.68			
41	Mars . . . S.F.	. .	. .	5.0	. .	. .	7 35 4.98	2.78					
42	Bessel . . . 341	. .	. .	25.8	. .	. .	7 35 25.78	4.30½	20.80	1.52½			
43	Mars . . . N.P.	. .	. .	34.1	. .	. .	7 36 34.08	3.62½					
44	Bessel . . . 341	. .	. .	56.0	. .	. .	7 36 55.98	4.27½	21.90	0.65			
45	Mars . . . S.F.	. .	. .	7.1	. .	. .	7 38 7.08	2.86					
46	Bessel . . . 341	. .	. .	27.6	. .	. .	7 38 27.58	4.31½	20.50	1.45½			
47	Mars . . . N.P.	. .	. .	30.3	. .	. .	7 39 30.28	3.60					
48	Bessel . . . 341	. .	. .	52.2	. .	. .	7 39 52.18	4.26	21.90	0.66			
49	Mars . . . S.F.	. .	. .	8.0	. .	. .	7 41 7.98	2.78½					
50	Bessel . . . 341	. .	. .	29.0	. .	. .	7 41 28.98	4.24	21.00	1.45½			
51	Mars . . . N.P.	. .	. .	50.0	. .	. .	7 42 49.98	3.61					
52	Bessel . . . 341	. .	. .	12.2	. .	. .	7 43 12.78	4.25	22.20	0.64			
53	Mars . . . S.F.	. .	. .	6.3	. .	. .	7 45 6.28	2.81					
54	Bessel . . . 341	. .	. .	27.5	. .	. .	7 45 27.48	4.19	21.20	1.38			
55	Mars . . . N.P.	. .	. .	25.1	. .	. .	7 46 25.08	3.56			27.886	64.9	59.5
56	Bessel . . . 341	. .	. .	47.5	. .	. .	7 46 47.48	4 29	22.40	0.73	Ther. att. 71°.5 Bar. red. to 32° F. 27.770		
57	Mars . . . S.F.	. .	. .	54.5	. .	. .	7 47 54.48	2.87					
58	Bessel . . . 341	. .	. .	16.1	. .	. .	7 48 16.08	+4.20½	—21.60	—1.33½			

Remarks.

Night very much the same as the last, and measures of like value. As there was no change for the better, it was considered useless to multiply them, after the planet had passed the meridian.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F. . .	Fifteen transits . . .	7 16 26.95	— 19.767	— 1.593	= 0 31.05
Mean N. P. . .	Fourteen transits . . .	7 17 33.54	— 20.657	— 0.789	= 0 15.38

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 16 . . .	— 3 50.60	Santiago sid. time S. F.	7 12 36.35
Correction for chronometer at	7 18 . . .	— 3 50.60	Santiago sid. time N. P.	7 13 42.94
			Interval	1 6.59

FEBRUARY 8, 1852—Continued.

Results—Continued.

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	16.65	Δ N. S. limbs micr. in rev.	0.803 = 15.67
Variation of A. R. in 1*m*. 7*s*.	— 0.93	Variation of declination in 1*m*. 7*s*. . .	— 0.12
Observed P. F. diameter	15.72	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	13.35
h. m.	″	h. m.	″
Δ ρ at 7 13	0.03	Δ ρ at 7 14	0.01

FEBRUARY 9, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	0.5	13.5	26.5	39.3	52.5	6 44 26.46	+3.62			27.969	66.7	59.6
2	Bessel . . . 341	37.0	50.0	3.4	16.3	29.3	6 46 3.20	—2.73	—1 36.74	+6.35			
3	Mars . . . N.P.	39.2	52.1	5.3	18.1	31.0	6 48 5.14	+4.25½			Ther. att. 73°.8		
4	Bessel . . . 341	17.0	30.0	43.0	56.0	8.9	6 49 42.98	—2.87	1 37.84	7.12½	Bar. red. to 32° F. 27.845		
5	Mars . . . S.F.	21.0	34.0	47.0	59.9	13.0	6 51 46.98	+3.41					
6	Bessel . . . 341	58.0	11.0	24.0	37.0	49.9	6 53 23.98	—3.02	1 37.00	6.43			
7	Mars . . . N.P.	49.5	2.5	15.6	28.5	41.5	6 55 15.52	+4.01					
8	Bessel . . . 341	27.8	41.0	53.8	6.6	19.5	6 56 53.74	—3.11½	1 38.22	7.12½			
9	Mars . . . S.F.	30.4	43.5	56.5	9.5	22.7	6 58 56.52	+3.19					
10	Bessel . . . 341	8.2	21.0	34.0	46.8	59.8	7 0 33.96	—3.23	1 37.44	6.42			
11	Mars . . . N.P.	19.3	32.2	45.2	58.1	11.1	7 2 45.18	+3.79½					
12	Bessel . . . 341	58.0	10.8	24.0	36.8	49.6	7 4 23.84	—3.41	1 38.66	7.20½			
13	Mars . . . S.F.	32.3	45.3	58.2	11.3	24.4	7 7 58.30	+3.10					
14	Bessel . . . 341	10.4	23.3	36.3	49.0	2.0	7 9 36.20	—3.31	1 37.90	6.41			
15	Mars . . . N.P.	30.5	43.5	56.7	9.6	22.6	7 11 56.58	+3.84					
16	Bessel . . . 341	10.0	22.8	36.0	48.9	1.7	7 13 35.88	—3.39	1 39.30	7.23			
17	Mars . . . S.F.	45.3	58.2	11.2	24.0	37.0	7 16 11.14	+3.04					
18	Bessel . . . 341	23.6	36.5	49.5	2.5	15.5	7 17 49.52	—3.45½	1 38.38	6.49½			
19	Mars . . . N.P.	5.5	18.6	31.6	44.5	57.5	7 20 31.54	+3.72					
20	Bessel . . . 341	45.0	58.0	. .	24.7	37.5	7 22 11.30	—3.53	1 39.76	7.25			
21	Mars . . . S.F.	2.0	15.0	28.2	41.0	54.3	7 25 28.10	+2.94					
22	Bessel . . . 341	. .	54.3	7.1	20.1	33.0	7 27 7.16	—3.59	1 39.06	6.53			
23	Mars . . . N.P.	36.0	49.2	2.3	15.2	28.3	7 29 2.20	+3.71					
24	Bessel . . . 341	16.7	29.6	42.9	55.5	8.2	7 30 42.58	—3.62	1 40.38	7.33			
25	Mars . . . S.F.	25.3	38.4	51.4	4.4	17.5	7 32 51.40	+2.91					
26	Bessel . . . 341	5.0	18.0	30.8	43.6	56.5	7 34 30.78	—3.68	1 39.38	6.59			
27	Mars . . . N.P.	1.2	14.3	27.4	40.4	53.4	7 36 27.34	+3.74					
28	Bessel . . . 341	42.3	55.0	8.0	21.0	33.8	7 38 8.02	—3.65	1 40.68	7.39			
29	Mars . . . S.F.	36.0	49.0	2.2	15.0	28.0	7 40 2.00	+2.86					
30	Bessel . . . 341	16.5	29.0	41.8	54.8	7.6	7 41 41.94	—3.66	1 39.94	6.52			
31	Mars . . . N.P.	13.2	26.2	39.2	52.3	5.3	7 43 39.24	+3.78½					
32	Bessel . . . 341	54.4	7.4	20.3	33.2	46.0	7 45 20.26	—3.70	1 41.02	7.48½			
33	Mars . . . N.P.	47.5	0.5	13.5	26.5	39.6	8 47 13.52	+3.07½					
34	Bessel . . . 341	. .	45.2	58.0	11.0	23.9	8 48 58.06	—4.71	1 44.54	7.78½			
35	Mars . . . N.P.	20.5	33.5	46.5	59.5	12.7	8 50 46.54	+3.29					
36	Bessel . . . 341	5.5	18.3	31.5	44.4	57.0	8 52 31.34	—4.47	—1 44.80	+7.76			

FEBRUARY 9, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
37	Mars . . . S.F.	30.5	43.7	56.6	9.5	22.6	8 54 56.58	+2.83			27.953	64.5	59.9
38	Bessel . . . 341	14.5	27.5	40.7	53.5	6.5	8 56 40.54	—4.20½	—1 43.96	+7.03½			
39	Mars . . . S.F.	7.8	20.8	33.8	46.8	59.8	8 58 33.80	+3.14½			Ther. att. 72°.6		
40	Bessel . . . 341	52.3	5.1	18.1	31.0	43.8	9 0 18.06	—3.90	1 44.26	7.04½	Bar. red. to 32° F. 27.833		
41	Mars . . . S.F.	52.5	5.4	18.5	31.4	44.5	9 2 18.46	+3.35½					
42	Bessel . . . 341	. .	50.0	3.0	15.8	28.7	9 4 2.91	—3.74	—1 44.45	+7.09½			

Remarks.

Fine night. Clean, steady images, and very satisfactory measures throughout.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	First eight transits . .	7 12 12.61	—1 38.230	+6.468	=2 6.06
Mean N. P. . .	First eight transits .	7 15 51.47	1 39.482	7.267	2 21.63
Mean N. P. . .	Last two transits . .	8 49 0.03	1 44.670	7.772	2 31.48
Mean S. F. . .	Last three transits . .	8 58 36.28	—1 44.223	+7.058	=2 17.55

	h. m.	m. s.
Correction for chronometer at	7 12 . . .	—3 54.08
Correction for chronometer at	7 16 . . .	—3 54.09

	h. m. s.
Santiago sid. time S. F.	7 8 18.53
Santiago sid. time N. P.	7 11 57.38
Interval	3 38.85

	″
Δ P. F. limbs in A. R. reduced to arc . . .	18.78
Variation of A. R. in 3*m*. 39*s*.	— 2.86
Observed P. F. diameter	15.92

	″
Δ N. S. limbs micr. in rev.	0.799 = 15.57
Variation of declination in 3*m*. 39*s*. . .	— 0.38
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	12.99

	h. m.	m. s.
Correction for chronometer at	8 49 . . .	—3 54.29
Correction for chronometer at	8 59 . . .	—3 54.30

	h. m. s.
Santiago sid. time N. P.	8 45 5.74
Santiago sid. time S. F.	8 54 41.98
Interval	9 36.24

	″
Δ P. F. limbs in A. R. reduced to arc . . .	6.70
Variation of A. R. in 9*m*. 36*s*.	+ 7.68
Observed P. F. diameter	14.38

	″
Δ N. S. limbs micr. in rev.	0.714 = 13.92
Variation of declination in 9*m*. 36*s*. .	+ 0.99
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	12.71

h. m.	″
Δ ρ at 7 9	0.13
Δ ρ at 7 13	0.14

h. m.	″
Δ ρ at 8 46	0.15
Δ ρ at 8 55	0.14

FEBRUARY 10, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 341	. .	. .	47.0	0.0	12.9	6 43 47.00	+5.47			27.887	72.8	58.5
2	Mars . . . S.F.	19.5	32.6	45.5	58.6	11.6	6 47 45.56	1.57	+3 58.56	—3.90	Ther. att. 76°.0		
3	Bessel . . . 341	15.5	28.6	41.6	54.5	7.5	6 50 41.54	5.16			Bar. red. to 32° F. 27.756		
4	Mars . . . N.P.	13.0	26.0	39.0	52.0	5.0	6 54 39.00	+2.07	+3 57.46	—3.09			

FEBRUARY 10, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
5	Bessel . . .	341	8.0	21.2	34.3	47.0	0.0	6 56 34.10	+4.97			27.887	72.8	58.5
6	Mars . . .	S.F.	6.4	19.5	32.5	45.4	58.4	7 0 32.44	1.19½	+3 58.34	—3.77½			
7	Bessel . . .	341	53.3	6.4	19.4	32.5	45.3	7 3 19.38	4.76½			Ther. att. 76°.0 Bar. red. to 32° F. 27.756		
8	Mars . . .	N.P.	50.0	3.0	16.3	29.0	42.2	7 7 16.10	1.80	3 56.72	2.96½			
9	Bessel . . .	341	8.5	21.5	34.5	47.5	0.6	7 9 34.52	4.78½					
10	Mars . . .	S.F.	. .	19.3	32.2	45.0	58.3	7 13 32.22	1.10	3 57.70	3.68½			
11	Bessel . . .	341	26.5	39.5	52.5	5.5	18.5	7 17 52.50	4.63					
12	Mars . . .	N.P.	22.5	35.4	48.4	1.2	14.5	7 21 48 40	1.77	3 55.90	2.86			
13	Bessel . . .	341	38.2	51.3	4.3	17.2	30.2	7 24 4.24	4.66					
14	Mars . . .	S.F.	34.7	47.6	0.7	13.7	26.8	7 28 0.70	1.09	3 56.46	3.57			
15	Bessel . . .	341	25.8	38.8	51.8	4.6	17.6	7 29 51.72	4.68					
16	Mars . . .	N.P.	21.0	34.1	47.1	0.0	13.2	7 33 47.08	1.80½	3 55.36	2.87½			
17	Bessel . . .	341	39.0	51.8	5.0	17.8	31.0	7 36 4.92	4.67					
18	Mars . . .	S.F.	34.8	47.5	0.7	13.7	27.0	7 40 0.74	1.10½	3 55.82	3.56½			
19	Bessel . . .	341	7.0	20.0	33.0	46.0	59.0	7 42 33.00	4.72					
20	Mars . . .	N.P.	1.5	14.5	27.5	40.5	53.5	7 46 27.50	2.15½	3 54.50	2.56½			
21	Bessel . . .	341	11.2	24.3	37.3	50.1	3.2	7 48 37.22	4.81½					
22	Mars . . .	S.F.	6.5	19.5	32.5	45.4	58.6	7 52 32.50	1.30½	3 55.28	3.51			
23	Bessel . . .	341	3.1	16.3	29.1	42.3	55.1	7 54 29.18	4.90					
24	Mars . . .	N.P.	57.0	10.0	23.2	36.0	49.4	7 58 23.12	2.16	3 53.94	2.74			
25	Bessel . . .	341	. .	9.5	22.5	35.4	48.5	8 0 22.48	4.98					
26	Mars . . .	S.F.	51.2	4.3	17.3	30.0	43.3	8 4 17.22	1.49½	3 54.74	3.48½			
27	Bessel . . .	341	46.0	59.0	12.0	25.0	38.0	8 6 12.00	5.10					
28	Mars . . .	N.P.	39.3	52.4	5.5	18.3	31.5	8 10 5.40	2.38	3 53.40	2.72			
29	Bessel . . .	341	. .	14.1	27.2	40.0	53.0	8 12 27.08	5.26					
30	Mars . . .	S.F.	55.0	8.0	20.8	33.6	47.0	8 16 20.88	1.81½	3 53.80	3.44½			
31	Bessel . . .	341	. .	2.0	14.8	27.8	41.0	8 25 14.90	4.77½					
32	Mars . . .	N.P.	41.0	54.0	7.0	20.0	33.0	8 29 7.00	2.12½	3 52.10	2.65			
33	Bessel . . .	341	36.5	49.5	2.6	15.5	28.5	8 33 2.52	5.13½			27.898	64.6	55.7
34	Mars . . .	S.F.	29.5	42.5	55.5	8.5	21.7	8 36 55.54	1.83	3 53.02	3.30½	Ther. att. 73°.6		
35	Bessel . . .	341	1.5	14.5	27.7	40.5	53.5	8 42 27.54	5.73½			Bar. red. to 32° F.		
36	Mars . . .	N.P.	53.0	6.0	19.0	32.0	45.0	8 46 19.00	+3.22	+3 51.46	—2.51½	27.774		

Remarks.

Night excellent; images sharp and steady. There are two other stars preceding and following this, respectively, about 7½s., and which coincide better in declination, but they are so very small that they will not bear illumination. The star used is not more than a 10½ or 10th magnitude at most. I can see well the dark portions of the planet with power 235, but am compelled to use very little light with the star.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Nine transits . . .	7 39 59.75	+3 55.969	—3.582	=1 9.81
Mean N. P.	Nine transits . . .	7 47 32.51	+3 54.538	—2.776	=0 54.10

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 40 . . .	—3 57.24	Santiago sid. time S. F.	7 36 2.51
Correction for chronometer at	7 48 . . .	—3 57.25	Santiago sid. time N. P.	7 43 35.26
			Interval	7 32.75

FEBRUARY 10, 1852—Continued.

Results—Continued.

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	21.91	Δ N. S. limbs micr. in rev.	0.806 = 15.71
Variation of A. R. in 7*m*. 33*s*.	— 5.87	Variation of declination in 7*m*. 33*s*. . .	— 0.72
Observed P. F. diameter	16.04	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	12.79

h. m.	″	h. m.	″
Δ ρ at 7 34	0.07	Δ ρ at 7 42	0.06

FEBRUARY 11, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	341	27.0	40.0	53.0	6.0	19.0	7 25 53.00	+2.48			27.956	63.9	57.8
2	Mars . . .	S.F.	10.3	23.4	36.5	49.3	2.5	7 28 36.40	5.44½	+2 43.40	+2.96½			
3	Bessel . . .	341	24.5	37.5	50.5	3.4	16.5	7 32 50.48	1.31½			Ther. att. 73°.9		
4	Mars . . .	N.P.	6.3	19.5	32.5	45.0	58.4	7 35 32.34	5.11	2 41.86	3.79½	Bar. red. to 32° F. 27.831		
5	Bessel . . .	341	17.8	30.7	43.7	56.6	9.5	7 37 43.66	1.28½					
6	Mars . . .	S.F.	0.5	13.5	26.5	39.5	52.5	7 40 26.50	+4.36½	2 42.84	3.08			
7	Bessel . . .	341	32.1	45.0	58.0	11.0	23.6	8 31 57.94	—1.88½					
8	Mars . . .	N.P.	10.9	23.8	37.0	50.0	3.0	8 34 36.94	+2.13½	2 39.00	4.02			
9	Bessel . . .	341	. .	. .	27.5	40.3	53.0	8 36 27.30	—1.81½					
10	Mars . . .	S.F.	40.5	53.7	6.6	19.6	32.8	8 39 6.64	+1.47	2 39.34	3.28½			
11	Bessel . . .	341	31.5	44.5	57.4	10.0	23.4	8 40 57.36	—1.58					
12	Mars . . .	N.P.	9.5	22.6	35.6	48.5	1.7	8 43 35.58	+2.43	3 38.22	4.01			
13	Bessel . . .	341	. .	. .	28.6	41.5	54.6	8 46 28.60	—2.91½					
14	Mars . . .	S.F.	. .	54.7	7.5	20.6	33.7	8 49 7.63	+0.46	2 39.03	3.37½			
15	Bessel . . .	341	10.6	23.6	36.5	49.5	2.5	8 51 36.54	—2.57					
16	Mars . . .	N.P.	48.2	1.3	14.4	27.3	40.5	8 54 14.34	+1.57½	2 37.80	4.14½			
17	Bessel . . .	341	14.3	27.1	40.3	53.0	6.0	8 56 40.14	—2.25					
18	Mars . . .	S.F.	52.5	5.5	18.5	31.4	44.6	8 59 18.50	+1.16½	2 38.36	3.41½			
19	Bessel . . .	341	. .	46.6	59.5	12.5	25.5	9 0 59.53	—1.92½					
20	Mars . . .	N.P.	10.5	23.5	36.7	49.6	2.6	9 3 36.58	+2.24½	+2 37.05	+4.17			

Remarks.

Night as preceding. The meridian circle observations show that this is the right star. Comparing it with H. C. 15707, it is a full magnitude smaller, so that the estimate of last night is correct. There is a star rather brighter in the same parallel with Mars, and following about 1*m*.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	First two transits . .	7 34 31.45	+2 43.120	+3.022	= 0 58.90
Mean N. P. .	First transit	7 35 32.34	2 41.860	3.795	1 13.96
Mean N. P. . .	Last four transits . .	8 49 0.86	2 38.017	4.086	1 19.64
Mean S. F. . .	Last three transits . .	8 49 10.92	+2 38.910	+3.358	= 1 5.45

h. m.	m. s.		h. m. s.
Correction for chronometer at 7 34 . . .	—4 0.36	Santiago sid. time S. F.	7 30 31.09
Correction for chronometer at 7 36 . . .	—4 0.36	Santiago sid. time N. P.	7 31 31.98
		Interval	1 0.89

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	18.90	Δ N. S. limbs micr. in rev.	0.773 = 15.07
Variation of A. R. in 1*m*. 1*s*.	— 0.76	Variation of declination in 1*m*. 1*s*. . .	— 0.09
Observed P. F. diameter	18.14	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	12.78

FEBRUARY 11, 1852—Continued.

Results—Continued.

	h. m.	m. s.
Correction for chronometer at	8 49	—4 0.52
Correction for chronometer at	8 49	—4 0.52

	h. m. s.
Santiago sid. time N. P.	8 45 0.34
Santiago sid. time S. F.	8 45 10.40
Interval	10.06

	"
Δ P. F. limbs in A. R. reduced to arc	13.39
Variation of A. R. in 10s.	+ 0.12
Observed P. F. diameter	13.51

	"
Δ N. S. limbs micr. in rev.	0.728 = 14.19
Variation of declination in 10s.	+ 0.02
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	12.01

	h. m.	"
Δ ρ at	7 29	0.06
Δ ρ at	7 30	0.07

	h. m.	"
Δ ρ at	8 44	0.08
Δ ρ at	8 44	0.06

FEBRUARY 12, 1852.

Cloudy.

FEBRUARY 13, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C.	15707	25.7	38.7	51.8	4.6	17.7	7 9 51.70	—3.33½			28.033	63.8	58.9
2	Mars	S.F.	0.5	13.5	26.6	39.6	52.7	7 14 26.58	+2.98	+4 34.88	+6.31½			
3	H. C.	15707	17.5	30.8	43.8	56.6	9.7	7 18 43.68	—3.75½			Ther. att. 69°.2 Bar. red. to 32° F. 27.923		
4	Mars	N.P.	51.2	4.3	17.2	30.3	43.3	7 23 17.26	+3.33½	4 33.58	7.09			
5	H. C.	15707	32.6	45.6	58.8	11.6	24.5	7 25 58.62	—3.73½					
6	Mars	S.F.	6.5	19.5	32.6	45.5	58.8	7 30 32.58	+2.70	4 33.96	6.43½			
7	H. C.	15707	20.5	33.0	46.0	58.7	11.9	7 32 46.02	—3.72½					
8	Mars	N.P.	52.5	5.5	18.6	31.5	44.5	7 37 18.52	+3.37½	4 32.50	7.10			
9	H. C.	15707	1.5	14.5	27.5	40.4	53.5	7 39 27.48	—3.73					
10 *a*	Mars	S.F.	34.8	47.7	0.7	13.7	26.9	7 44 0.76	+2.73	4 33.28	6.46			
11	H. C.	15707	19.8	32.5	45.5	58.5	11.5	7 45 45.56	—3.72½					
12	Mars	N.P.	51.6	4.7	17.6	30.5	43.5	7 50 17.58	+3.52	4 32.02	7.24½			
13	H. C.	15707	. .	28.6	41.5	54.4	7.5	8 26 41.50	—2.63					
14	Mars	S.F.	46.5	59.5	12.5	25.5	38.5	8 31 12.50	+3.99½	4 31.00	6.62½			
15	H. C.	15707	7.3	20.2	33.3	46.1	59.0	8 33 33.18	—2.27½			28.023	62.8	58.8
16	Mars	N.P.	36.7	50.0	3.0	15.9	29.0	8 38 2.92	+5.11	4 29.74	7.38½			
17	H. C.	15707	50.0	3.0	16.0	29.0	42.0	8 40 16.00	—1.98					
18	Mars	S.F.	20.4	33.5	46.5	59.4	12.5	8 44 46.46	+4.67	4 30.46	6.65	Ther. att. 68°.6 Bar. red. to 32° F. 27.912		
19	H. C.	15707	18.3	31.5	44.6	57.4	10.5	8 46 44.46	—1.60					
20	Mars	N.P.	47.5	0.5	13.5	26.5	39.5	8 51 13.50	+5.82½	+4 29.04	+7.42½			

Remarks.

Images blurred and unsteady all the evening, and measures only tolerable.

a Recorded 43*m*. 55.7*s*. at wire C.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	First three transits	7 29 39.97	+4 34.040	+6.403	=2 4.79
Mean N. P.	First three transits	7 36 57.79	4 32.700	7.145	2 19.26
Mean S. F.	Last two transits	8 37 59.48	4 30.730	6.637	2 9.35
Mean N. P.	Last two transits	8 44 38.21	+4 29.390	+7.405	=2 24.32

FEBRUARY 12, 1852—Continued.

Results—Continued.

	h. m.	m. s.
Correction for chronometer at	7 30	—4 6.71
Correction for chronometer at	7 37	—4 6.72

	h. m. s.
Santiago sid. time S. F.	7 25 33.26
Santiago sid. time N. P.	7 32 51.07
Interval	7 17.81

	″
Δ P. F. limbs in A. R. reduced to arc	20.10
Variation of A. R. in 7*m*. 18*s*.	— 5.01
Observed P. F. diameter	15.09

	″
Δ N. S. limbs micr. in rev.	0.742 = 14.46
Variation of declination in 7*m*. 18*s*.	— 0.47
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	11.79

	h. m.	m. s.
Correction for chronometer at	8 38	—4 6.84
Correction for chronometer at	8 45	—4 6.86

	h. m. s.
Santiago sid. time S. F.	8 33 52.64
Santiago sid. time N. P.	8 40 31.35
Interval	6 38.71

	″
Δ P. F. limbs in A. R. reduced to arc	20.10
Variation of A. R. in 6*m*. 39*s*.	— 4.56
Observed P. F. diameter	15.54

	″
Δ N. S. limbs micr. in rev.	0.768 = 14.97
Variation of declination in 6*m*. 39*s*.	— 0.43
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	12.34

	h. m.	″
Δ ρ at	7 23	0.13
Δ ρ at	7 31	0.14
Δ ρ at	8 32	0.13
Δ ρ at	8 38	0.15

FEBRUARY 14, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	341	. .	48.3	1.5	14.5	27.5	6 48 1.46	+6.73			27.977		62.8
2	Mars . . .	S.F.	18.5	31.6	44.6	57.6	10.8	6 51 44.62	1.50	+3 43.16	—5.23			
3	Bessel . . .	341	0.0	13.0	26.0	39.0	52.2	6 54 26.04	6.44½			Ther. att. 74°.0 Bar. red. to 32° F. 27.852		
4	Mars . . .	N.P.	42.3	55.5	8.4	21.3	34.5	6 58 8.40	1.98	3 42.36	4.46½			
5	Bessel . . .	341	. .	9.0	22.0	35.0	48.0	7 2 22.01	6.49					
6	Mars . . .	S.F.	38.0	51.4	4.5	17.5	30.5	7 6 4.38	1.30	3 42.37	5.19			
7	Bessel . . .	341	. .	31.2	44.1	. .	9.7	7 8 44.03	6.48					
8	Mars . . .	N.P.	59.5	12.5	25.5	38.5	51.6	7 12 25.52	1.90	3 41.49	4.58			
9	Bessel . . .	341	15.0	28.3	41.4	54.3	7.4	7 15 41.28	6.16					
10	Mars . . .	S.F.	57.5	10.5	23.5	36.5	49.6	7 19 23.52	0.93½	3 42.24	5.22½			
11	Bessel . . .	341	. .	23.1	36.2	49.3	2.2	7 27 36.21	+2.63½					
12	Mars . . .	N.P.	50.5	3.4	16.5	29.5	42.5	7 31 16.48	—1.75	3 40.27	4.38½			
13	Bessel . . .	341	8.5	21.5	34.5	47.5	0.5	7 33 34.50	+2.57					
14	Mars . . .	S.F.	50.0	3.2	16.0	29.2	42.2	7 37 16.12	—2.58½	3 41.62	5.15½			
15	Bessel . . .	341	21.0	34.0	47.0	0.2	13.0	7 39 47.04	+2.53½					
16	Mars . . .	N.P.	1.2	14.0	27.0	40.2	53.2	7 43 27.12	—1.80½	3 40.08	4.34			
17	Bessel . . .	341	19.5	31.5	44.5	57.5	10.5	7 45 44.70	+2.57½					
18	Mars . . .	S.F.	59.0	12.5	25.5	38.3	51.5	7 49 25.36	—2.48	3 40.66	5.05½			
19	Bessel . . .	341	46.8	59.6	12.6	25.6	38.5	7 52 12.62	+2.58					
20	Mars . . .	N.P.	26.5	39.5	52.3	5.2	18.3	7 55 52.36	—1.74½	3 39.74	4.32½			
21	Bessel . . .	341	53.0	6.0	19.0	32.0	45.0	7 58 19.00	+2.73½					
22	Mars . . .	S.F.	33.5	46.5	59.4	12.4	25.5	8 1 59.46	—2.35	3 40.46	5.08½			
23	Bessel . . .	341	47.5	0.5	13.5	26.5	39.5	8 4 13.50	+2.83½					
24	Mars . . .	N.P.	26.5	39.5	52.6	5.5	18.5	8 7 52.52	—1.41	+3 39.02	—4.27½			

FEBRUARY 14, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
25	Bessel . . .	341	45.0	58.0	11.2	24.2	37.3	8 10 11.14	+3.02			27.992	60.2	
26	Mars . . .	S.F.	24.6	38.0	50.8	3.7	16.8	8 13 50.78	—1.99½	+3 39.64	—5.01½			
27	Bessel . . .	341	. .	45.5	58.7	11.5	24.5	8 15 58.56	+1.61			Ther. att. 71°.0		
28	Mars . . .	N.P.	10.7	23.6	37.0	49.8	3.0	8 19 36.82	—2.67	3 38.26	4.28	Bar. red. to 32° F. 27.876		
29	Bessel . . .	341	14.7	27.7	. .	54.3	7.5	8 21 41.05	+1.80½					
30	Mars . . .	S.F.	53.6	6.7	19.6	32.8	45.6	8 25 19.66	—3.12	3 38.61	4.92½			
31	Bessel . . .	341	14.4	27.4	40.4	53.5	6.5	8 27 40.44	+2.07					
32	Mars . . .	N.P.	52.2	5.1	18.2	31.0	44.5	8 31 18.20	—2.14½	3 37.76	4.21½			
33	Bessel . . .	341	52.5	5.5	18.5	31.5	44.5	8 33 18.50	+2.35½					
34	Mars . . .	S.F.	31.0	44.2	57.2	10.0	23.3	8 36 57.14	—2.60	3 38.64	4.95½			
35 *a*	Bessel . . .	341	30.1	43.6	56.2	9.2	22.2	8 38 56.26	+2.63½					
36	Mars . . .	N.P.	7.5	20.5	33.5	46.3	59.5	8 42 33.46	—1.60	+3 37.20	—4.23½			

Remarks.

Much haze: rendering the star very indistinct at times, and keeping the images always blurred and wavy. The star is more than a magnitude smaller than H. C. 15707, which is therefore put down as a 9th.

a Recorded 40.1*s*. at wire A.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Nine transits . . .	7 46 53.45	+3 40.822	— 5.093	= 1 39.26
Mean N. P. . . .	Nine transits . . .	7 53 36.76	+3 39.576	— 4.344	= 1 24.66

	h. m.	m. s.
Correction for chronometer at	7 47 . . .	— 4 9.63
Correction for chronometer at	7 54 . . .	— 4 9.64

	h. m. s.
Santiago sid. time S. F.	7 42 43.82
Santiago sid. time N. P.	7 49 27.12
Interval	6 43.30

	″
Δ P. F. limbs in A. R. reduced to arc . . .	18.69
Variation of A. R. in 6*m*. 43*s*.	— 4.40
Observed P. F. diameter	14.29

		″
Δ N. S. limbs micr. in rev.	0.749	= 14.60
Variation of declination in 6*m*. 43*s*. .		— 0.37
Corr. for diam. of micr. wires . . .		— 2.20
Observed N. S. diameter		12.03

	h. m.	″
Δ ρ at	7 41	0.10
Δ ρ at	7 48	0.08

FEBRUARY 15, 1852.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	341	. .	16.5	29.5	42.5	55.4	6 18 29.51	+3.35½			28.028		57.3
2	Mars . . .	S.F.	46.5	59.5	12.5	25.5	39.3	6 21 12.66	1.78	+2 43.15	—1.57½			
3	Bessel . . .	341	3.6	16.5	29.6	42.5	55.5	6 23 29.54	2.92½			Ther. att. 71°.7		
4	Mars . . .	N.P.	. .	59.0	12.0	24.7	38.0	6 26 11.96	2.10	2 42.42	0.82½	Bar. red. to 32° F. 27.910		
5	Bessel . . .	341	12.5	25.5	38.5	51.3	4.5	6 28 38.46	2.75					
6	Mars . . .	S.F.	55.5	8.5	21.5	34.5	47.6	6 31 21.52	1.21½	+2 43.06	—1.53½			

FEBRUARY 15, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
7	Bessel . . . 341	47.2	0.2	13.2	26.2	39.0	6 34 13.16	+2.54			28.032	61.2	55.0
8	Mars . . . N.P.	28.8	41.8	54.7	7.7	20.8	6 36 54.76	1.77	+2 41.60	−0.77			
9	Bessel . . . 341	57.0	10.2	23.3	36.2	49.2	6 39 23.18	2.30½			Ther. att. 68°.8 Bar. red. to 32° F. 27.923		
10	Mars . . . S.F.	39.8	52.8	5.8	18.6	31.8	6 42 5.76	0.75	2 42.58	1.55½			
11	Bessel . . . 341	0.5	13.5	26.5	39.4	52.4	6 44 26.46	2.91					
12	Mars . . . N.P.	41.5	54.5	7.7	20.8	33.7	6 47 7.64	2.18	2 41.18	0.73			
13	Bessel . . . 341	0.4	13.3	26.5	39.3	52.2	6 50 26.34	2.80					
14	Mars . . . S.F.	42.0	55.2	8.3	22.3	35.3	6 53 8.62	1.32	2 42.28	1.48			
15	Bessel . . . 341	6.5	19.5	32.5	45.4	58.5	6 55 32.48	2.42½					
16	Mars . . . N.P.	47.0	0.0	13.0	26.2	39.3	6 58 13.10	1.67	2 40.62	0.75½			
17	Bessel . . . 341	38.3	51.3	4.4	17.4	30.3	7 0 4.34	2.47					
18	Mars . . . S.F.	19.5	32.6	45.5	58.6	11.8	7 2 45.60	1.01	2 41.26	1.46			
19	Bessel . . . 341	12.5	25.6	38.5	51.5	4.5	7 4 38.52	2.36					
20	Mars . . . N.P.	53.0	6.0	19.2	32.0	45.5	7 7 19.14	1.66	2 40.62	0.70			
21	Bessel . . . 341	5.5	18.5	31.5	44.5	57.5	7 9 31.50	2.30					
22	Mars . . . S.F.	46.3	59.5	12.5	25.5	38.5	7 12 12.46	0.78	2 40.96	1.52			
23	Bessel . . . 341	51.4	4.5	17.5	30.5	43.5	7 14 17.48	2.19					
24	Mars . . . N.P.	31.4	44.5	57.4	10.5	23.5	7 16 57.46	1.51	2 39.98	0.68			
25	Bessel . . . 341	19.3	32.5	45.5	58.5	11.5	7 18 45.46	2.17					
26	Mars . . . S.F.	0.0	13.2	26.2	39.2	52.5	7 21 26.22	0.77	2 40.76	1.40			
27	Bessel . . . 341	33.0	46.0	59.0	12.0	24.8	7 24 58.96	2.16½					
28	Mars . . . N.P.	12.8	25.3	38.5	51.4	4.5	7 27 38.50	1.48½	2 39.54	0.68			
29	Bessel . . 341	17.5	30.7	43.5	56.6	9.5	7 29 43.56	2.02½					
30	Mars . . . S.F.	57.8	10.8	23.8	36.8	50.3	7 32 23.90	0.65	2 40.34	1.37½			
31	Bessel . . . 341	10.0	23.0	36.0	49.0	2.0	7 34 36.00	2.08					
32	Mars . . . N.P.	49.0	2.0	15.0	28.0	41.0	7 37 15.00	1.48½	2 39.00	0.59½			
33	Bessel . . . 341	. .	22.5	35.5	48.5	1.5	7 38 35.52	2.20					
34	Mars . . . S.F.	49.3	2.2	15.3	28.3	41.5	7 41 15.32	0.84	2 39.80	1.36			
35	Bessel . . . 341	. .	29.0	42.0	55.0	8.0	7 42 42.03	2.27					
36	Mars . . . N.P.	54.5	7.5	20.5	33.7	46.7	7 45 20.58	+1.72	+2 38.55	−0.55			

Remarks.

Same remarks applicable as last night.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . . Nine transits . . .	7 1 59.12	+2 41.577 . . .	−1.473	= 0 28.71
Mean N. P. . . . Nine transits . . .	7 6 59.79	+2 40.390 . . .	−0.698	= 0 13.60

	h. m.	m. s.
Correction for chronometer at	7 2 . . .	−4 12.00
Correction for chronometer at	7 7 . . .	−4 12.01

	h. m. s.
Santiago sid. time S. F.	6 57 47.12
Santiago sid. time N. P.	7 2 47.78
Interval	5 0.66

	″
Δ P. F. limbs in A. R. reduced to arc . . .	17.80
Variation of A. R. in 5*m*. 1*s*.	− 3.12
Observed P. F. diameter	14.68

	″
Δ N. S. limbs micr. in rev.	0.775 = 15.10
Variation of declination in 5*m*. 1*s*. . .	− 0.23
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	12.67

h. m.	″
Δ ρ at 6 56	0.03
Δ ρ at 7 1	0.01

FEBRUARY 16, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	Bessel . . . 341	. .	46.0	59.0	11.8	24.7	6 28 58.91	—2.22			27.963	71.2	59.3
2	Mars . . . S.F.	17.5	30.8	43.8	56.5	9.7	6 30 43.66	0.63½	+1 44.75	+1.58½			
3	Bessel . . . 341	. .	2.5	15.3	28.2	41.0	6 33 15.28	5.03			Ther. att. 73°.7		
4	Mars . . . N.P.	32.8	45.8	58.6	11.5	24.5	6 34 58.64	2.72	1 43.36	2.31	Bar. red. to 32° F.		
5	Bessel . . . 341	33.5	46.5	59.5	12.3	25.0	6 37 59.36	4.99			27.840		
6	Mars . . . S.F.	17.8	30.5	44.0	56.6	9.8	6 39 43.74	3.38	1 44.38	1.61			
7	Bessel . . . 341	48.0	1.2	14.3	27.0	39.9	6 44 14.08	5.25					
8	Mars . . . N.P.	31.0	44.0	57.1	10.0	23.2	6 45 57.06	2.89½	1 42.98	2.35½			
9	Bessel . . . 341	34.3	46.6	0.5	. .	25.5	6 47 59.96	5.38					
10	Mars . . . N.P.	17.0	30.0	43.1	55.8	9.0	6 49 42.98	2.98	1 43.02	2.40			
11	Bessel . . . 341	54.5	7.5	20.5	33.3	46.0	6 53 20.36	5.60					
12	Mars . . . S.F.	37.5	51.0	4.0	16.8	30.0	6 55 3.86	3.97½	1 43.50	1.62½			
13	Bessel . . . 341	37.7	50.6	3.6	16.6	29.6	6 57 3.62	5.71½					
14	Mars . . . S.F.	21.2	34.3	47.4	0.2	13.5	6 58 47.32	4.10½	1 43.70	1.61			
15	Bessel . . . 341	10.0	23.0	36.0	49.0	1.8	7 0 35.96	5.79½					
16	Mars . . . N.P.	52.5	5.5	18.5	31.3	44.5	7 2 18.46	3.37	1 42.50	2.42½			
17	Bessel . . . 341	32.9	45.9	58.8	11.7	24.6	7 4 58.78	5.98					
18	Mars . . . S.F.	15.9	29.0	42.0	54.8	8.2	7 6 41.98	4.32	1 43.20	1.66			
19 b	Bessel . . . 341	. .	37.5	50.6	3.5	16.3	7 8 50.51	5.97					
20	Mars . . . N.P.	6.5	19.6	32.6	45.6	58.8	7 10 32.62	3.55	1 42.11	2.42			
21 c	Bessel . . . 341	52.0	5.0	18.0	30.8	43.5	7 13 17.86	6.16½					
22	Mars . . . S.F.	34.6	47.5	0.8	13.8	26.8	7 15 0.70	4.62	1 42.84	1.54½			
23	Bessel . . . 341	59.2	12.0	25.0	37.8	50.7	7 18 24.94	6.17					
24	Mars . . . N.P.	40.5	53.5	6.6	19.5	32.7	7 20 6.56	3.72	1 41.62	2.45			
25 d	Bessel . . . 341	29.6	42.5	55.6	8.5	21.4	7 21 55.52	6.15½					
26	Mars . . . S.F.	12.0	25.2	38.0	51.0	4.3	7 23 38.10	4.40	1 42.58	1.75½			
27	Bessel . . . 341	22.0	34.8	47.8	0.8	13.6	7 25 47.80	6.18					
28	Mars . . . N.P.	3.0	16.0	29.3	42.3	55.5	7 27 29.22	3.72	1 41.42	2.46			
29	Bessel . . . 341	10.5	23.5	36.5	49.5	2.3	7 29 36.46	6.19					
30	Mars . . . S.F.	52.5	5.5	18.5	31.5	44.6	7 31 18.52	4.46	1 42.06	1.73			
31	Bessel . . . 341	46.0	58.5	11.5	24.5	37.3	7 33 11.56	6.20					
32	Mars . . . N.P.	26.5	39.5	52.7	5.5	18.6	7 34 52.56	3.74	1 41.00	2.46			
33	Bessel . . . 341	29.5	42.0	55.0	7.8	20.7	7 36 55.00	6.20½					
34	Mars . . . S.F.	10.5	23.5	36.8	49.7	2.7	7 38 36.64	4.52	1 41.64	1.68½			
35	Bessel . . . 341	. .	40.5	53.4	6.4	19.3	7 40 53.43	6.17					
36	Mars . . . N.P.	8.0	21.0	34.0	47.0	0.0	7 42 34.00	3.67½	1 40.57	2.49½			
37	Bessel . . . 341	1.5	14.5	27.5	40.3	53.3	7 44 27.42	6.07½					
38	Mars . . . S.F.	43.0	56.0	9.0	22.0	35.0	7 46 9.00	4.46	1 41.58	1.61½			
39	Bessel . . . 341	53.0	6.0	19.0	32.0	44.7	7 48 18.94	6.17½					
40	Mars . . . N.P.	33.3	46.4	59.5	12.4	25.4	7 49 59.40	3.68	1 40.46	2.49½			
41	Bessel . . . 341	18.8	31.5	44.6	57.5	10.5	7 52 44.58	6.16					
42	Mars . . . S.F.	59.9	12.9	25.8	38.8	51.8	7 54 25.84	4.37	1 41.26	1.79			
43	Bessel . . . 341	5.4	18.2	31.0	44.0	56.6	7 57 31.04	6.01					
44	Mars . . . N.P.	45.0	58.0	11.0	24.0	37.0	7 59 11.00	3.55	1 39.96	2.46			
45	Bessel . . . 341	42.5	55.5	8.5	21.5	34.5	8 1 8.50	5.95½					
46	Mars . . . S.F.	23.4	36.4	49.4	2.3	15.6	8 2 49.42	—4.17	+1 40.92	+1.78½			

FEBRUARY 16, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 341	38.0	51.0	4.0	16.8	29.8	8 6 3.92	—5.85			27.963	58.7	55.3
48	Mars . . . N.P.	17.5	30.5	43.7	56.6	9.7	8 7 43.60	3.34	+1 39.68	+2.51			
49	Bessel . . . 341	30.6	43.0	56.0	8.8	21.8	8 9 56.04	5.72			Ther. att. 70°.0		
50	Mars . . . S.F.	10.5	23.5	36.5	49.5	2.5	8 11 36.50	3.94	1 40.46	1.78	Bar. red. to 32° F.		
51	Bessel . . . 341	6.5	19.5	32.5	45.5	58.4	8 13 32.48	5.62			27.850		
52	Mars . . . N.P.	45.8	58.6	11.7	24.8	37.8	8 15 11.74	3.14½	1 39.26	2.47½			
53	Bessel . . . 341	53.5	6.4	19.5	32.3	45.1	8 17 19.36	5.49½					
54	Mars . . . N.P.	32.5	45.5	58.5	11.5	24.5	8 18 58.50	2.94	1 39.14	2.55½			
55	Bessel . . . 341	59.8	12.8	26.0	38.8	51.6	8 21 25.80	5.34½					
56	Mars . . . S.F.	39.8	52.8	5.9	18.8	32.0	8 23 5.86	3.50½	1 40.06	1.84			
57	Bessel . . . 341	21.0	33.8	46.8	59.8	12.6	8 24 46.80	5.22					
58	Mars . . . S.F.	0.5	13.6	26.5	. .	52.8	8 26 26.58	3.42	1 39.78	1.80			
59	Bessel . . . 341	55.0	7.5	21.0	34.0	46.8	8 28 20.86	5.11½					
60	Mars . . . N.P.	33.5	46.5	59.5	12.5	25.7	8 29 59.54	—2.55	+1 38.68	+2.56½			

Remarks.

a Blurred and unsteady during all the observations from *a* to *b*.

c Much better.

d Sharp and steady. All that follow are fine observations.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Fifteen transits . . .	7 30 56.52	+ 1 42.181 . . .	+ 1.694	= 0 33.02
Mean N. P. . .	Fifteen transits . . .	7 33 58.39	+ 1 41.051 . . .	+ 2.456	= 0 47.87

	h. m.	m. s.
Correction for chronometer at	7 31 . . .	— 4 14.57
Correction for chronometer at	7 34 . . .	— 4 14.58

	h. m. s.
Santiago sid. time S. F.	7 26 41.95
Santiago sid. time N. P.	7 29 43.81
Interval	3 1.86

	″
Δ P. F. limbs in A. R. reduced to arc . .	16.95
Variation of A. R. in 3*m*. 2*s*.	— 1.78
Observed P. F. diameter	15.17

	″
Δ N. S. limbs micr. in rev.	0.762 = 14.85
Variation of declination in 3*m*. 2*s*. . .	— 0.11
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	12.54

h. m.	″	h. m.	″
Δ ρ at 7 26	0.03	Δ ρ at 7 29	0.05

FEBRUARY 17, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . . 341	53.6	6.6	19.8	32.9	46.0	6 30 19.76	+3.66			27.960	59.8	54.6
2	Mars . . . S.F.	. .	. .	9.0	22.3	5.0	6 31 9.16	+7.57½	+49.40	+3.91½			
3	Bessel . . . 341	38.5	51.5	4.5	. .	. .	6 36 4.43	—1.60			Ther. att. 70°.3		
4	Mars . . . N.P.	27.0	. .	53.2	6.1	19.2	6 36 53.13	+3.19	48.70	4.79	Bar. red. to 32° F.		
5	Bessel . . . 341	0.5	13.5	26.5	. .	. .	6 39 26.43	—1.66½			27.846		
6	Mars . . . S.F.	49.5	3.0	16.0	29.0	42.3	6 40 15.96	+2.38½	+49.53	+4.05			

FEBRUARY 17, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
7	Bessel . . .	341	37.0	50.0	3.0	. .	. .	6 44 2.93	—1.69½			27.960	59.8	54.6
8	Mars . . .	N.P.	26.0	. .	51.5	4.3	17.5	6 44 51.59	+3.00½	+48.66	+4.70			
9	Bessel . . .	341	54.5	7.5	20.5	. .	. .	6 48 20.43	—1.90½			Ther. att. 70°.3 Bar. red. to 32° F. 27.846		
10	Mars . . .	S.F.	43.5	56.5	9.5	22.5	36.0	6 49 9.60	+2.11½	49.17	4.02			
11	Bessel . . .	341	. .	. .	2.6	. .	. .	6 52 2.58	—1.93					
12	Mars . . .	N.P.	. .	37.5	50.5	3.5	. .	6 52 50.49	+2.81	47.91	4.74			
13 *a*	Bessel . . .	341	. .	. .	11.7	. .	. .	6 54 11.68	—1.94					
14	Mars . . .	S.F.	. .	47.5	0.8	13.6	. .	6 55 0.63	+2.22	48.95	4.16			
15	Bessel . . .	341	. .	. .	25.6	. .	. .	6 56 25.58	—1.70½					
16	Mars . . .	N.P.	. .	0.5	13.5	26.5	. .	6 57 13.49	+3.07	47.91	4.77½			
17	Bessel . . .	341	. .	. .	37.6	. .	. .	6 58 37.58	—1.77½					
18	Mars . . .	S.F.	. .	13.4	26.3	39.3	. .	6 59 26.33	+2.33½	48.75	4.11			
19	Bessel . . .	341	. .	. .	46.5	. .	. .	7 0 46.48	—1.87½					
20	Mars . . .	N.P.	. .	21.2	34.0	47.0	. .	7 1 34.06	+2.96½	47.58	4.84			
21	Bessel . . .	341	. .	. .	50.0	. .	. .	7 3 49.98	—1.90					
22	Mars . . .	S.F.	. .	25.5	38.5	51.4	. .	7 4 38.46	+2.21	48.48	4.11			
23	Bessel . . .	341	. .	. .	57.5	. .	. .	7 5 57.48	—1.92					
24	Mars . . .	N.P.	. .	31.6	44.6	57.5	. .	7 6 44.56	+2.89	47.08	4.81			
25	Bessel . . .	341	. .	. .	16.0	. .	. .	7 7 15.98	—1.97					
26	Mars . . .	S.F.	. .	51.2	4.3	17.2	. .	7 8 4.23	+2.17	48.25	4.14			
27	Bessel . . .	341	. .	. .	39.0	. .	. .	7 10 38.98	—1.94½					
28	Mars . . .	N.P.	. .	13.0	26.0	39.0	. .	7 11 25.99	+2.83	47.01	4.77½			
29	Bessel . . .	341	. .	. .	52.0	. .	. .	7 12 51.98	—2.03					
30	Mars . . .	S.F.	. .	27.0	40.0	53.0	. .	7 13 39.99	+2.09	48.01	4.12			
31 *b*	Bessel . . .	341	. .	. .	48.0	. .	. .	7 15 47.98	—2.16					
32	Mars . . .	N.P.	. .	22.0	35.1	48.1	. .	7 16 35.06	+2.67	47.08	4.83			
33	Bessel . . .	341	. .	. .	7.6	. .	. .	7 18 7.58	—2.05½					
34	Mars . . .	S.F.	. .	42.5	55.3	8.4	. .	7 18 55.39	+2.07½	47.81	4.13			
35	Bessel . . .	341	. .	. .	17.0	. .	. .	7 20 16.98	—2.10					
36	Mars . . .	N.P.	. .	50.5	3.5	16.5	. .	7 21 3.49	+2.72	46.51	4.82			
37	Bessel . . .	341	. .	. .	12.0	. .	. .	7 22 11.98	—2.09½					
38	Mars . . .	S.F.	. .	46.5	59.6	12.5	. .	7 22 59.53	+1.99	47.55	4.08½			
39	Bessel . . .	341	. .	. .	33.1	. .	. .	7 24 33.08	—2.20½					
40	Mars . . .	N.P.	. .	6.5	19.5	32.6	. .	7 25 19.53	+2.68	46.45	4.88½			
41	Bessel . . .	341	. .	. .	37.4	. .	. .	7 27 37.38	—2.16½					
42	Mars . . .	S.F.	. .	11.6	24.6	37.5	. .	7 28 24.56	+2.00½	47.18	4.17			
43	Bessel . . .	341	. .	. .	39.0	. .	. .	7 29 38.98	—2.14					
44	Mars . . .	N.P.	. .	12.5	25.5	38.5	. .	7 30 25.49	+2.70	46.51	4.84			
45	Bessel . . .	341	. .	. .	36.0	. .	. .	7 31 35.98	—2.16					
46	Mars . . .	S.F.	. .	10.2	23.0	36.0	. .	7 32 23.06	+2.01½	47.08	4.17½			
47	Bessel . . .	341	. .	. .	34.0	. .	. .	7 33 33.98	—2.16					
48	Mars . . .	N.P.	. .	7.3	20.3	33.3	. .	7 34 20.29	+2.70	46.31	4.86			
49	Bessel . . .	341	. .	. .	27.0	. .	. .	7 35 26.98	—2.09½					
50	Mars . . .	S.F.	. .	1.5	14.3	27.4	. .	7 36 14.39	+2.05	47.41	4.14½			
51	Bessel . . .	341	. .	. .	30.5	. .	. .	7 37 30.48	—2.06					
52	Mars . . .	N.P.	. .	3.5	16.5	29.5	. .	7 38 16.49	+2.81	+46.01	+4.87			

FEBRUARY 17, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
53	Bessel . . .	341	. .	. .	18.5	. .	. .	7 39 18.48	—2.05			27.962	59.0	52.3
54	Mars . . .	S.F.	. .	52.3	5.4	18.4	. .	7 40 5.36	+2.10	+46.88	+4.15			
55	Bessel . . .	341	. .	. .	28.1	. .	. .	7 41 28.08	—1.97½			Ther. att. 66°.7		
56	Mars . . .	N.P.	. .	1.0	14.0	27.0	. .	7 42 13.99	+2.90½	45.91	4.88	Bar. red. to 32° F.		
57	Bessel . . .	341	. .	. .	5.2	. .	. .	7 44 5.18	—2.04½			27.860		
58	Mars . . .	S.F.	. .	38.8	51.7	4.6	. .	7 44 51.69	+2.13½	46.51	4.18			
59	Bessel . . .	341	. .	. .	8.5	. .	. .	7 46 8.48	—1.95½					
60	Mars . . .	N.P.	. .	41.0	54.3	7.2	. .	7 46 54.16	+2.91	45.68	4.86½			
61	Bessel . . .	341	. .	. .	45.1	. .	. .	7 49 45.08	—1.89					
62	Mars . . .	S.F.	. .	18.6	31.7	44.5	. .	7 50 31.59	+2.30½	46.51	4.19½			
63	Bessel . . .	341	. .	. .	54.3	. .	. .	7 51 54.28	—1.84					
64	Mars . . .	N.P.	. .	26.6	39.8	52.8	. .	7 52 39.73	+3.07	45.45	4.91			
65	Bessel . . .	341	. .	. .	1.1	. .	. .	7 54 1.08	—1.79					
66	Mars . . .	S.F.	. .	34.3	47.5	0.3	. .	7 54 47.36	+2.38	46.28	4.17			
67	Bessel . . .	341	. .	. .	15.3	. .	. .	7 56 15.28	—1.78½					
68	Mars . . .	N.P.	. .	47.0	0.5	13.6	. .	7 57 0.36	+3.12½	45.08	4.91			
69	Bessel . . .	341	. .	. .	10.5	. .	. .	7 58 10.48	—1.72					
70	Mars . . .	S.F.	. .	43.8	56.8	9.8	. .	7 58 56.79	+2.48½	46.31	4.20½			
71	Bessel . . .	341	. .	. .	13.3	. .	. .	8 0 13.28	—1.70					
72	Mars . . .	N.P.	. .	45.5	58.5	11.5	. .	8 0 58.49	+3.23½	45.21	4.93½			
73	Bessel . . .	341	. .	. .	7.5	. .	. .	8 2 7.48	—1.61					
74	Mars . . .	S.F.	. .	40.6	53.5	6.4	. .	8 2 53.49	+2.56	46.01	4.17			
75	Bessel . . .	341	. .	. .	33.5	. .	. .	8 5 33.48	—1.53					
76	Mars . . .	N.P.	. .	5.5	18.5	31.3	. .	8 6 18.43	+3.40	44.95	4.93			
77	Bessel . . .	341	. .	. .	37.0	. .	. .	8 7 36.98	—3.26					
78	Mars . . .	S.F.	. .	9.8	22.7	35.5	. .	8 8 22.66	+0.96½	45.68	4.22½			
79	Bessel . . .	341	. .	. .	6.3	. .	. .	8 10 6.28	—3.20					
80	Mars . . .	N.P.	. .	38.0	51.0	3.8	. .	8 10 50.93	+1.71	44.65	4.91			
81	Bessel . . .	341	. .	. .	56.6	. .	. .	8 12 56.58	—3.09½					
82	Mars . . .	S.F.	. .	29.4	42.3	55.3	. .	8 13 42.33	+1.08	45.75	4.17½			
83	Bessel . . .	341	. .	. .	5.0	. .	. .	8 15 4.98	—3.09½					
84	Mars . . .	N.P.	. .	36.5	49.6	2.5	. .	8 15 49.53	+1.88	44.55	4.97½			
85	Bessel . . .	341	. .	. .	8.0	. .	. .	8 17 7.98	—2.95					
86	Mars . . .	S.F.	. .	40.5	53.5	6.5	. .	8 17 53.49	+1.24	45.51	4.19			
87	Bessel . . .	341	. .	. .	6.5	. .	. .	8 20 6.48	—2.93½					
88	Mars . . .	N.P.	. .	37.6	51.0	4.0	. .	8 20 50.86	+2.03½	44.38	4.97			
89	Bessel . . .	341	. .	. .	14.0	. .	. .	8 21 13.98	—2.82					
90	Mars . . .	S.F.	. .	46.5	59.5	12.5	. .	8 21 59.49	+1.40	45.51	4.22			
91	Bessel . . .	341	. .	. .	36.4	. .	. .	8 23 36.38	—2.75½					
92	Mars . . .	N.P.	. .	7.5	20.5	33.5	. .	8 24 20.49	+2.20	44.11	4.95½			
93	Bessel . . .	341	. .	. .	15.6	. .	. .	8 26 15.58	—2.58½					
94	Mars . . .	S.F.	. .	47.6	0.6	13.6	. .	8 27 0.59	+1.68	45.01	4.26½			
95	Bessel . . .	341	. .	. .	3.6	. .	. .	8 28 3.58	—2.53					
96	Mars . . .	N.P.	. .	34.4	47.7	0.5	. .	8 28 47.53	+2.47	+43.95	+5.00			

FEBRUARY 17, 1852—Continued.

Remarks.

At commencement images indifferently defined, and motion by no means uniform; later they became better, and the work is very satisfactory.

a Sharp. *b* Blurred and unsteady.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F.	Twenty-four transits	7 33 23.59	+ 47.230	+ 4.145	= 1 20.79
Mean N. P.	Twenty-four transits	7 36 0.76	+ 46.152	+ 4.866	= 1 34.84

	m. s.		h. m. s.
Correction for chronometer at 7h. 33m.	— 4 17.37	Santiago sid. time S. F.	7 29 6.22
Correction for chronometer at 7h. 36m.	— 4 17.38	Santiago sid. time N. P.	7 31 43.38
		Interval	2 37.16

	″		″
Δ P. F. limbs in A. R. reduced to arc	16.17	Δ N. S. limbs micr. in rev.	0.721 = 14.05
Variation of A. R. in 2*m*. 37*s*.	— 1.44	Variation of declination in 2*m*. 37*s*.	— 0.07
Observed P. F. diameter	14.73	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	11.78

	″		″
Δ ρ at 7h. 29m.	0.08	Δ ρ at 7h. 31m.	0.09

FEBRUARY 18, 1852.

Up to 7*h*. 50*m*. the image of the planet was like a reflection from disturbed mercury, and it was not possible to make a measure. At that time the lamps went out, and could not be made to burn afterwards.

FEBRUARY 19, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars	S.F.	50.7	4.0	17.0	30.0	. .	6 46 16.88	+3.48½			27.974	61.9	57.7
2	Bessel	341	. .	55.3	8.0	20.3	34.0	6 47 7.93	—3.59	—51.05	+7.07½			
3	Mars	N.P.	. .	16.5	29.6	42.5	. .	6 49 29.53	+3.84			Ther. att. 71°.2 Bar. red. to 32° F. 27.858		
4	Bessel	341	. .	. .	21.7	. .	48.0	6 50 21.93	—4.02	52.40	7.86			
5	Mars	S.F.	5.5	18.8	31.7	44.6	. .	6 53 31.61	+3.05½					
6	Bessel	341	. .	. .	22.8	. .	. .	6 54 22.78	—4 11½	51.17	7.17			
7	Mars	N.P.	14.5	27.5	40.5	. .	. .	6 56 40.43	+3.64					
8	Bessel	341	. .	. .	33.0	. .	58.8	6 57 32.96	—4.11	52.53	7.75			
9	Mars	S.F.	30.5	43.5	56.4	. .	. .	6 59 56.38	+2.80½					
10	Bessel	341	. .	35.3	47.5	1.0	14.0	7 0 47.98	—4.27	51.60	7.07½			
11	Mars	N.P.	38.5	51.5	4.6	. .	. .	7 4 4.46	+3.44					
12	Bessel	341	31.5	44.5	57.5	. .	23.5	7 4 57.48	—4.33	53.02	7.77			
13	Mars	S.F.	3.5	16.8	29.8	. .	. .	7 7 29.63	+2.66					
14	Bessel	341	. .	8.8	21.8	34.8	47.8	7 8 21.83	—4.44	52.20	7.10			
15	Mars	N.P.	17.4	30.5	43.4	. .	. .	7 11 43.36	+2.65					
16	Bessel	341	10.5	23.3	36.4	. .	. .	7 12 36.33	—5.10½	52.97	7.75½			
17	Mars	S.F.	10.3	23.5	36.5	. .	. .	7 19 36.36	+1.49½					
18	Bessel	341	. .	. .	28.8	. .	. .	7 20 28.78	—5.61½	52.42	7.11			
19	Mars	N.P.	5.5	18.5	31.5	. .	. .	7 24 31.43	+2.25					
20	Bessel	341	. .	11.7	25.0	. .	. .	7 25 24.81	—5.50½	—53.38	+7.75½			

FEBRUARY 19, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
21	Mars . . .	S.F.	48.8	1.8	14.8	. .	. .	7 29 14.73	+1.47½			27.976	60.2	55.3
22	Bessel . . .	341	41.3	54.5	7.7	. .	33.5	7 30 7.48	—5.61	—52.75	+7.08½			
23	Mars . . .	N.P.	42.5	55.5	8.5	. .	. .	7 32 8.43	+2.30			Ther. att. 67°.6 Bar. red. to 32° F. 27.870		
24	Bessel . . .	341	36.5	49.5	2.5	15.5	28.5	7 33 2.50	—5.53	54.07	7.83			
25	Mars . . .	S.F.	51.1	4.2	17.2	. .	. .	7 35 17.09	+1.58					
26	Bessel . . .	341	. .	57.5	10.3	23.3	36.2	7 36 10.36	—5.47½	53.27	7.05½			
27	Mars . . .	N.P.	. .	. .	6.6	. .	. .	7 38 6.58	+2.32					
28	Bessel . . .	341	. .	. .	0.5	. .	. .	7 39 0.48	—5 47	53.90	7.79			
29	Mars . . .	S.F.	. .	. .	59.0	. .	. .	7 39 58.98	+1.61					
30	Bessel . . .	341	. .	. .	51.6	. .	. .	7 40 51.58	—5.44	53.60	7.05			
31	Mars . . .	N.P.	. .	. .	1.6	. .	. .	7 42 1.58	+2.36½					
32	Bessel . . .	341	. .	. .	55.7	. .	. .	7 42 55.68	—5.40	54.10	7.76½			
33	Mars . . .	S.F.	. .	. .	22.0	. .	. .	7 44 21.98	+1.65					
34	Bessel . . .	341	. .	. .	15.0	. .	. .	7 45 14.98	—5.37½	—53.00	+7.02½			

Remarks.

Much haze. The planet blurred, though tolerably steady, but the comparing star so dim that the measures of it are in many cases very doubtful. At 7*h.* 45*m.* the lamps went.

Results.

		h. m. s.		s.	Rev.	′ ″
Mean S. F. . . .	Nine transits . . .	7 17 18.18		— 52.340	+ 7.083	= 2 18.05
Mean N. P. . . .	Eight transits . . .	7 17 20.72		— 53.295	+ 7.784	= 2 31.71

Correction for chronometer at 7 17 (h. m.) . . .	— 4 22.49 (m. s.)	Santiago sid. time S. F.	7 12 55.69 (h. m. s.)
Correction for chronometer at 7 17 . . .	— 4 22.49	Santiago sid. time N. P.	7 12 58.23
		Interval	2.54
Δ P. F. limbs in A. R. reduced to arc . . .	14.32″	Δ N. S. limbs micr. in rev. . . . . . . 0.701 =	13.66″
Variation of A. R. in 3s.	± 0.00	Variation of declination in 3s.	± 0.00
Observed P. F. diameter	14.32	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	11.46
Δ ρ at 7 13 (h. m.)	0.14″	Δ ρ at 7 13 (h. m.)	0.15″

FEBRUARY 20, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . .	S.F.	2.7	15.7	28.8	41.6	54.7	6 19 28.70	+2.73½			28.019	62.5	59.9
2	Bessel . . .	341	. .	50.0	3.0	. .	. .	6 21 2.96	—4.85½	—1 34.26	+7.59			
3	Mars . . .	N.P.	56.0	8.7	21.8	35.0	47.8	6 23 21.86	+3.23			Ther. att. 73°.0 Bar. red. to 32° F. 27.897		
4	Bessel . . .	341	. .	45.2	58.2	. .	. .	6 24 58.16	—5.06	1 36.30	8.29			
5	Mars . . .	S.F.	4.4	17.5	30.5	43.5	56.6	6 27 30.50	+1.90					
6	Bessel . . .	341	. .	53.0	6.0	18.8	31.6	6 29 5.88	—5.67	—1 35.38	+7.57			

FEBRUARY 20, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
7	Mars . . .	N.P.	29.5	42.3	55.4	8.3	21.3	6 30 55.36	+2.49			28.019	62.5	59.9
8	Bessel . . .	341	6.0	18.5	31.5	44.5	57.3	6 32 31.56	−5.79½	−1 36.20	+8.28½			
9	Mars . . .	N.P.	9.5	22.6	35.5	48.5	2.0	6 34 35.62	+2.23			Ther. att. 73°.0		
10	Bessel . . .	341	47.0	59.8	12.0	25.0	. .	6 36 12.40	−6.03	1 36.78	8 26	Bar. red. to 32° F.		
11	Mars . . .	S.F.	16.3	29.4	42.8	55.3	8.5	6 38 42.46	+1.42			27.897		
12	Bessel . . .	341	52.5	5.5	18.5	31.2	44.0	6 40 18.34	−6.12	1 35.88	7.54			
13	Mars . . .	S.F.	39.3	52.4	5.5	18.5	31.7	6 42 5.48	+1.25					
14	Bessel . . .	341	15.5	28.5	41.5	54.5	7.3	6 43 41.46	−6.30	1 35.98	7.55			
15	Mars . . .	N.P.	5.0	18.0	31.2	44.1	57.3	6 48 31.12	+4.07½					
16	Bessel . . .	341	42.0	55.2	8.2	21.2	33.8	6 50 8.08	−4.27½	1 36.96	8.35			
17	Mars . . .	S.F.	39.0	52.0	5.2	18.1	31.0	6 52 5.06	+3.17					
18	Bessel . . .	341	. .	28.5	41.8	. .	7.5	6 53 41.63	−4.39½	1 36.57	7.56½			
19	Mars . . .	N.P.	17.6	30.6	44.0	56.6	9.6	6 56 43.68	+3.72					
20	Bessel . . .	341	55.3	8.2	21.4	34.3	47.0	6 58 21.24	−4.52½	1 37.56	8.24½			
21	Mars . . .	S.F.	8.0	21.2	34.3	47.3	0.5	7 1 34.26	+2.85					
22	Bessel . . .	341	45.0	58.0	10.8	23.7	36.5	7 3 10.80	−4.68½	1 36.54	7.53½			
23	Mars . . .	S.F.	32.0	45.0	58.0	11.0	24.0	7 4 58.00	+2.67					
24	Bessel . . .	341	8.6	21.8	34.8	47.8	0.6	7 6 34.72	−4.85	1 36.72	7.52			
25 a	Mars . . .	N.P.	33.2	46.5	59.5	12.8	25.8	7 9 59.56	+3.34					
26	Bessel . . .	341	12.5	. .	37.5	50.6	3.5	7 11 37.78	−4.90	1 38.22	8.24			
27 b	Mars . . .	N.P.	17.7	31.0	44.0	57.0	9.7	7 13 43.88	+3.29					
28	Bessel . . .	341	56.2	9.0	22.3	35.3	48.0	7 15 22.16	−4.96½	1 38.28	8.25½			
29 c	Mars . . .	S.F.	4.5	17.6	30.5	43.6	56.5	7 20 30.54	+2.50½					
30	Bessel . . .	341	42.3	55.0	8.0	20.8	33.7	7 22 7.96	−5.05½	1 37.42	7.56			
31 d	Mars . . .	N.P.	55.5	8.5	. .	35.0	48.0	7 24 21.74	+3.18½					
32	Bessel . . .	341	34.3	47.3	0.4	13.3	26.2	7 26 0.30	−5.08	1 38.56	8.26½			
33	Mars . .	S.F.	56.3	9.5	22.5	35.5	48.5	7 28 22.46	+2.38					
34	Bessel . . .	341	. .	47.0	59.8	12.8	25.7	7 29 59.86	−5.17	1 37.40	7.55			
35	Mars . . .	N.P.	29.2	42.5	55.6	8.5	21.5	7 32 55.46	+3.07½					
36	Bessel . . .	341	8.0	21.0	34.0	46.8	0.0	7 34 33.96	−5.18	1 38.50	8.25½			
37	Mars . . .	S.F.	33.0	46.0	59.0	12.2	25.0	7 37 59.04	+2.40					
38	Bessel . . .	341	10.6	23.8	36.8	49.8	2.6	7 39 36.72	−5.19½	1 37.68	7.59½			
39	Mars . . .	N.P.	59.0	12.5	25.3	38.8	51.7	7 41 25.46	+3.11					
40	Bessel . . .	341	38.5	51.2	4.2	17.1	30.3	7 43 4.26	−5.13	1 38.80	8.24			
41	Mars . . .	S.F.	30.8	43.8	56.8	9.7	22.6	7 46 56.74	+2.45					
42	Bessel . . .	341	9.5	22.0	35.3	48.0	1.0	7 48 35.16	−5.10½	1 38.42	7.55½			
43	Mars . . .	N.P.	12.0	25.0	38.0	51.0	3.7	7 50 37.94	+3.19					
44	Bessel . . .	341	51.5	4.2	17.5	30.0	43.0	7 52 17.24	−5.07	1 39.30	8.26			
45	Mars . . .	S.F.	12.5	25.3	38.1	51.1	4.5	7 54 38.30	+2.54					
46	Bessel . . .	341	51.0	3.6	. .	30.0	42.6	7 56 16.80	−5.02	1 38.50	7.56			
47	Mars . . .	N.P.	10.7	23.6	36.8	49.8	2.5	7 59 36.68	+3.36½					
48	Bessel . . .	341	. .	3.5	16.5	29.4	42.5	8 1 16.51	−4.93	1 39.83	8.29½			
49	Mars . . .	S.F.	47.3	0.5	13.4	26.3	39.5	8 3 13.40	+2.73					
50	Bessel . . .	341	26.1	39.0	51.6	4.6	17.7	8 4 51.80	−4.86	1 38.40	7.59			
51	Mars . . .	N.P.	9.1	22.0	35.2	48.1	1.2	8 6 35.12	+3.50					
52	Bessel . . .	341	48.8	1.7	14.9	27.8	40.6	8 8 14.76	−4.74	−1 39.64	+8.24			

FEBRUARY 20, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
53	Mars . . . S.F.	47.2	1.0	14.0	27.0	40.2	8 10 13.88	+2.91½			28.014	62.2	57.1
54	Bessel . . . 341	27.2	40.3	53.2	6.0	19.0	8 11 53.14	—4.62½	—1 39.26	+7.54			
55	Mars . . . N.P.	32.5	46.0	58.8	11.7	25.0	8 13 58.80	+3.72½			Ther. att. 69°.6 Bar. red. to 32° F. 27.902		
56	Bessel . . . 341	13.0	25.7	38.6	51.6	4.6	8 15 38.70	—4.57	1 39.90	8.29½			
57	Mars . . . S.F.	4.6	18.0	31.0	43.7	57.0	8 17 30.86	+3.14½					
58	Bessel . . . 341	44.0	57.3	9.8	23.0	36.0	8 19 10.02	—4.44	1 39.16	7.58½			
59	Mars . . . N.P.	35.5	48.5	1.5	14.5	27.6	8 21 1.52	+4.00					
60	Bessel . . . 341	15.5	28.7	41.8	54.8	7.6	8 22 41.68	—4.28	—1 40.16	+8.28			

Remarks.

Except the few observations otherwise noted, the evening has been good and measures satisfactory.

a Blurred. *b* Worse. *c* Tolerably good. *d* Sharp.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Fifteen transits . . .	7 19 3.31	—1 37.171 . . .	+7.560	=2 27.34
Mean N. P. . . .	Fifteen transits . . .	7 23 13.59	—1 38.333 . . .	+8.264	=2 41.06

	m. s.		h. m. s.
Correction for chronometer at 7h. 19m. . . .	—4 25.37	Santiago sid. time S. F.	7 14 37.94
Correction for chronometer at 7 23 . . .	—4 25.38	Santiago sid. time N. P.	7 18 48.21
		Interval	4 10.27

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	17.43	Δ N. S. limbs micr. in rev.	0.704=13.72
Variation of A. R. in 4*m*. 10*s*.	— 1.87	Variation of declination in 4*m*. 10*s*. . .	— 0.01
Observed P. F. diameter	15.56	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	11.51

	″		″
Δ ρ at 7h. 16m.	0.15	Δ ρ at 7h. 20m.	0.16

FEBRUARY 21, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	1.0	14.3	27.2	40.2	53.4	6 25 27.22	+1.39			27.906	73.8	60.8
2	Bessel . . . 341	18.2	. .	44.3	56.9	10.0	6 27 44.10	—6.08	—2 16.88	+7.47			
3	Mars . . . N.P.	0.0	13.0	26.2	39.0	52.3	6 34 26.10	+3.99			Ther. att. 76°.7 Bar. red. to 32° F. 27.773		
4	Bessel . . . 341	18.5	31.5	44.5	57.4	10.2	6 36 44.42	—4.22½	2 18.32	8.21½			
5	Mars . . . S.F.	51.8	5.0	18.0	30.8	43.6	6 39 17.84	+3.02					
6	Bessel . . . 341	9.5	22.5	35.3	48.2	1.0	6 41 35.30	—4.45	2 17.46	7.47			
7	Mars . . . N.P.	5.0	18.2	31.0	44.0	57.2	6 44 31.08	+3.54					
8	Bessel . . . 341	. .	36.5	49.6	2.5	15.5	6 46 49.56	—4.65½	2 18.48	8.19½			
9	Mars . . . S.F.	30.6	44.3	57.3	10.2	23.5	6 48 57.18	+2.60½					
10	Bessel . . . 341	49.0	2.0	15.0	27.8	41.0	6 51 14.96	—4.87½	—2 17.78	+7.48			

FEBRUARY 21, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	Mars . . . S.F.	47.8	1.0	14.0	27.0	40.0	6 54 13.96	+2.37½			27.906	73.8	60.8
12	Bessel . . . 341	6.0	18.8	31.6	44.5	57.5	6 56 31.68	—5.10	—2 17.72	+7.47½			
13	Mars . . . N.P.	35.8	49.0	2.0	15.0	28.0	7 1 1.96	+2.74			Ther. att 76°.7 Bar. red. to 32° F. 27.773		
14	Bessel . . . 341	55.2	8.0	21.0	34.0	46.8	7 3 21.00	—5.39	2 19.04	8.13			
15	Mars . . . N.P.	53.7	6.8	19.8	32.8	46.0	7 5 19.82	+2.63½					
16	Bessel . . . 341	. .	26.0	. .	52.0	4.8	7 7 38.98	—5.52	2 19.16	8.15½			
17	Mars . . . S.F.	16.2	29.3	42.4	55.3	8.4	7 14 42.32	+1.67½					
18	Bessel . . . 341	. .	48.0	0.7	13.7	26.6	7 17 0.78	—5.78	2 18.46	7.45½			
19	Mars . . . N.P.	26.4	39.5	52.5	5.4	. .	7 18 52.41	+2.37½					
20	Bessel . . . 341	. .	59.0	12.0	25.0	38.0	7 21 12.04	—5.79½	2 19.63	8.17			
21	Mars . . . S.F.	56.7	9.7	22.7	35.7	49.0	7 24 22.76	+1.65					
22	Bessel . . . 341	. .	28.6	41.6	54.6	7.6	7 26 41.63	—5.79	2 18.87	7.44			
23	Mars . . . N.P.	28.3	41.8	55.0	7.8	21.0	7 28 54.78	+2.31½					
24	Bessel . . . 341	49.0	1.8	14.8	27.7	40.6	7 31 14.78	—5.87	2 20.00	8.18½			
25	Mars . . . S.F.	40.0	53.2	6.1	19.1	32.5	7 33 6.18	+1.56½					
26	Bessel . . . 341	59.5	12.2	25.3	38.0	51.0	7 35 25.20	—5.80½	2 19.02	7.37			
27	Mars . . . N.P.	54.6	7.6	20.7	33.6	46.6	7 37 20.62	+2.37					
28	Bessel . . . 341	. .	27.6	40.7	53.8	6.6	7 39 40.72	—5.83½	2 20.10	8.20½			
29	Mars . . . S.F.	41.5	54.8	7.8	20.8	34.0	7 43 7.78	+1.69					
30	Bessel . . . 341	. .	14.3	27.3	40.2	53.0	7 45 27.23	—5.74	2 19.45	7.43			
31	Mars . . . N.P.	44.2	57.0	10.2	23.2	36.4	7 47 10.20	+2.42					
32	Bessel . . . 341	5.0	17.8	30.6	43.6	56.5	7 49 30.70	—5.70	2 20.50	8.12			
33	Mars . . . S.F.	52.0	4.8	17.8	30.7	43.7	7 51 17.80	+1.76					
34	Bessel . . . 341	11.5	24.5	37.5	50.4	3.4	7 53 37.46	—5.68	2 19.66	7.44			
35	Mars . . . N.P.	8.5	21.6	34.7	47.6	0.6	7 56 34.60	+2.60					
36	Bessel . . . 341	. .	42.6	55.6	8.5	21.5	7 58 55.58	—5.56	2 20.98	8.16			
37	Mars . . . S.F.	23.5	36.5	49.5	2.5	15.7	8 1 49.54	+1.98½					
38	Bessel . . . 341	. .	56.5	9.5	22.5	35.4	8 4 9.51	—5.50	2 19.97	7.48½			
39	Mars . . . N.P.	39.5	52.5	5.6	18.6	31.5	8 6 5.54	+2.74					
40	Bessel . . . 341	. .	13.5	26.5	39.5	52.5	8 8 26.53	—5.37	2 20.99	8.11			
41	Mars . . . S.F.	0.5	13.7	26.7	39.7	52.7	8 11 26.66	+2.21					
42	Bessel . . . 341	. .	34.0	47.0	59.8	13.0	8 13 46.98	—5.23½	2 20.32	7.44½			
43	Mars . . . N.P.	23.6	36.3	49.4	2.3	15.4	8 15 49.40	+3.07					
44	Bessel . . . 341	. .	57.5	10.5	23.4	36.3	8 18 10.46	—5.08	2 21.06	8.15			
45	Mars . . . S.F.	54.5	7.5	20.5	33.5	46.5	8 20 20.50	+2.56					
46	Bessel . . . 341	. .	27.9	41.0	53.7	7.0	8 22 40.93	—4.92½	2 20.43	7.48½			
47	Mars . . . N.P.	10.5	. .	37.0	49.7	3.0	8 24 36.81	+3.44			27.916	68.2	59.0
48	Bessel . . . 341	32.5	45.5	58.5	11.3	24.5	8 26 58.46	—4.75	2 21.65	8.19			
49	Mars . . . S.F.	47.6	0.5	13.7	26.6	39.7	8 29 13.62	+2.84½			Ther. att. 72°.7 Bar. red. to 32° F. 27.795		
50	Bessel . . . 341	. .	21.3	34.6	47.4	0.5	8 31 34.48	—4.58½	2 20.86	7.43			
51	Mars . . . N.P.	51.5	4.2	17.5	30.7	43.6	8 33 17.50	+3.70					
52	Bessel . . . 341	. .	26.5	39.5	52.2	5.0	8 35 39.33	—4.45	—2 21.83	+8.15			

Remarks.

An extremely fine night. Images sharp and steady, and satisfactory measures throughout.

FEBRUARY 21, 1852—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Thirteen transits	7 30 34.10	−2 18.991	+7.460	=2 25.39
Mean N. P.	Thirteen transits	7 36 27.76	−2 20.134	+8.164	=2 39.12

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 31	−4 29.12	Santiago sid. time S. F.	7 26 4.98
Correction for chronometer at	7 36	−4 29.13	Santiago sid. time N. P.	7 31 58.63
			Interval	5 53.65

	″		″
Δ P. F. limbs in A. R. reduced to arc	17.14	Δ N. S. limbs micr. in rev.	0.704 = 13.72
Variation of A. R. in 5*m*. 54*s*.	− 2.44	Variation of declination in 5*m* 54*s*.	+ 0.01
Observed P. F. diameter	14.70	Corr. for diam. of micr. wires	− 2.20
		Observed N. S. diameter	11.53

h. m.	″	h. m.	″
Δ ρ at 7 27	0.15	Δ ρ at 7 33	0.16

FEBRUARY 22, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars	S.F.	36.8	50.0	3.0	15.8	29.3	6 50 2.98	+2.77			27.968		60.7
2	Bessel	341	33.0	46.0	59.5	12.5	25.0	6 52 59.20	−3.95	−2 56.22	+6.72			
3	Mars	N.P.	56.2	9.2	22.5	35.3	48.0	6 55 22.24	+3.33			Ther. att. 73°.4		
4	Bessel	341	53.5	6.5	19.5	32.3	45.2	6 58 19.40	−4.13½	2 57.16	7.46½	Bar. red. to 32° F. 27.846		
5	Mars	S.F.	55.7	8.6	21.6	34.6	47.6	7 3 21.62	+2.43					
6	Bessel	341	52.0	4.8	18.0	. .	44.0	7 6 17.93	−4.34½	2 56.31	6.77½			
7	Mars	N.P.	18.3	31.5	44.5	57.2	10.3	7 9 44.36	+4.29					
8	Bessel	341	15.5	28.6	41.5	54.5	7.5	7 12 41.52	−3.22½	2 57.16	7.51½			
9	Mars	S.F.	43.3	56.4	9.3	22.3	35.5	7 16 9.36	+3.48					
10	Bessel	341	39.6	52.8	6.0	19.0	32.3	7 19 5.94	−3.29½	2 56.58	6.77½			
11	Mars	N.P.	2.5	15.7	28.5	41.7	55.0	7 21 28.68	+4.09					
12	Bessel	341	0.2	13.5	26.5	39.5	52.5	7 24 26.44	−3.36	2 57.76	7.45			
13	Mars	S.F.	10.8	23.6	36.5	49.3	2.3	7 26 36.50	+3.39					
14	Bessel	341	7.0	20.0	33.1	46.1	59.5	7 29 33.14	−3.45	2 56.64	6.84			
15	Mars	N.P.	39.8	53.1	6.2	19.0	32.0	7 31 6.02	+4.07					
16	Bessel	341	38.0	51.0	4.0	17.0	30.0	7 34 4.00	−3.39½	−2 57.98	+7.46½			

Remarks.

So blurred and unsteady all the evening, that the measures are little better than guesses.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Four transits	7 9 2.61	−2 56.437	+6.777	=2 12.08
Mean N. P.	Four transits	7 14 25.32	−2 57.515	+7.474	=2 25.67

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 9	−4 32.67	Santiago sid. time S. F.	7 4 29.94
Correction for chronometer at	7 14	−4 32.68	Santiago sid. time N. P.	7 9 52.64
			Interval	5 22.70

	″		″
Δ P. F. limbs in A. R. reduced to arc	16.17	Δ N. S. limbs micr. in rev.	0.697 = 13.58
Variation of A. R. in 5*m*. 23*s*.	− 2.04	Variation of declination in 5*m*. 23*s*.	+ 0.07
Observed P. F. diameter	14.13	Corr. for diam. of micr. wires	− 2.20
		Observed N. S. diameter	11.45

h. m.	″	h. m.	″
Δ ρ at 7 6	0.13	Δ ρ at 7 11	0.15

FEBRUARY 23, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	12.8	25.9	38.8	51.6	5.0	5 57 38.82	+2.07			27.964	63.3	60.4
2	Bessel . . . 341	. .	. .	8.5	21.0	33.8	6 1 8.10	−3.66½	−3 29.28	+5.73½			
3	Mars . . . N.P.	38.4	51.5	4.5	17.5	30.5	6 4 4.48	+2.14			Ther. att 71°.0		
4	Bessel . . . 341	8.5	21.5	34.6	47.5	0.5	6 7 34.52	−4.06	3 30.04	6.20	Bar. red. to 32° F. 27.848		
5	Mars . . . S.F.	38.0	51.0	4.2	17.0	30.3	6 10 4.10	+1.09½					
6	Bessel . . . 341	8.0	20.5	34.0	47.0	59.5	6 14 33.80	−4.54	3 29.70	5.63½			
7	Mars . . . N.P.	27.4	40.6	53.7	6.6	19.5	6 15 53.56	+1.24					
8	Bessel . . . 341	58.5	11.3	24.3	37.3	50.1	6 19 24.30	−5.02	3 30.74	6.26			
9	Mars . . . S.F.	38.5	51.5	4.5	17.4	30.7	6 22 4.52	+1.43½					
10	Bessel . . . 341	8.5	21.5	34.5	47.4	0.3	6 25 34.44	−4.16½	3 29.92	5.60			
11	Mars . . . N.P.	28.9	42.0	55.0	7.8	21.0	6 27 54.94	+1.79					
12	Bessel . . . 341	0.0	13.0	25.8	. .	51.7	6 31 25.86	−4.41	3 30.92	6.20			
13	Mars . . . S.F.	39.6	52.7	5.7	18.7	31.7	6 36 5.68	+0.69½					
14	Bessel . . . 341	10.0	23.0	36.0	48.8	1.6	6 39 35.88	−4.89½	3 30.20	5.59			
15 a	Mars . . . N.P.	13.3	26.8	40.0	53.0	5.5	6 41 39.72	+1.18½					
16	Bessel . . . 341	45.5	58.4	11.3	24.0	37.0	6 45 11.24	−5.03	3 31.52	6.21½			
17 a	Mars . . . S.F.	53.7	6.8	19.8	32.7	46.0	6 48 19.80	+0.34					
18	Bessel . . . 341	24.5	37.5	50.5	3.0	16.3	6 51 50.36	−5.24	3 30.56	5.58			
19 a	Mars . . . N.P.	18.5	31.5	44.5	57.5	10.6	6 59 44.52	+0.70½					
20	Bessel . . . 341	. .	3.5	16.5	29.4	42.4	7 3 16.47	−5.56	3 31.95	6.26½			
21	Mars . . . S.F.	20.5	33.3	46.3	59.3	12.3	7 11 46.34	+2.76					
22	Bessel . . . 341	. .	4.5	17.5	30.5	43.5	7 15 17.52	−2.80½	3 31.18	5.56½			
23	Mars . . . N.P.	31.5	44.6	57.6	10.5	23.5	7 17 57.54	+3.36					
24	Bessel . . . 341	4.1	17.0	30.0	43.0	55.6	7 21 29.94	−2.88	3 32.40	6.24			
25	Mars . . . S.F.	3.5	16.6	29.7	42.6	56.0	7 23 29.68	+2.63½					
26	Bessel . . . 341	35.5	48.0	1.0	14.0	26.8	7 27 1.06	−2.91	3 31.38	5.54½			
27	Mars . . . N.P.	42.5	55.3	8.3	21.3	34.5	7 29 8.38	+3.34½					
28	Bessel . . . 341	15.0	28.0	41.0	53.8	6.6	7 32 40.88	−2.88	3 32.50	6.22½			
29	Mars . . . S.F.	26.5	39.5	52.5	5.0	18.5	7 34 52.40	+2.65½					
30	Bessel . . . 341	58.0	11.0	24.0	37.0	50.0	7 38 24.00	−2.89½	3 31.60	5.55			
31	Mars . . . N.P.	54.2	7.0	20.3	33.2	46.3	7 40 20.20	+3.35					
32	Bessel . . . 341	26.8	39.8	53.0	5.8	18.8	7 43 52.84	−2.87½	3 32.64	6.22½			
33	Mars . . . S.F.	45.5	58.5	11.5	24.5	37.5	7 46 11.50	+2.70					
34	Bessel . . . 341	17.5	30.5	43.5	. .	9.5	7 49 43.48	−2.78½	3 31.98	5.48½			
35	Mars . . . N.P.	50.0	3.0	16.1	29.0	42.3	7 52 16.08	+3.47½					
36	Bessel . . . 341	. .	36.0	49.0	2.0	15.0	7 55 49.02	−2.64	3 32.94	6.11½			
37	Mars . . . S.F.	22.5	35.3	48.5	1.4	14.5	7 57 48.44	+2.97½					
38	Bessel . . . 341	55.0	7.5	20.5	33.6	46.5	8 1 20.62	−2.52	3 32.18	5.49½			
39	Mars . . . N.P.	33.5	46.5	59.5	12.5	25.5	8 2 59.50	+3.80½					
40	Bessel . . . 341	6.8	19.7	32.8	. .	59.0	8 6 32.81	−2.39	3 33.31	6.19½	27.962	58.2	57.0
41	Mars . . . S.F.	10.3	23.4	36.5	49.5	2.5	8 8 36.44	+3.25½					
42	Bessel . . . 341	. .	56.0	9.0	22.0	35.0	8 12 9.02	−2.18½	3 32.58	5.44	Ther. att. 67°.7		
43	Mars . . . N.P.	22.5	35.5	48.7	1.6	14.7	8 13 48.60	+4.10½			Bar. red. to 32° F.		
44	Bessel . . . 341	56.5	9.2	22.3	35.3	48.3	8 17 22.32	−1.99	−3 33.72	+6.09½	27.856		

FEBRUARY 23, 1852—Continued.

Remarks.

Quite sharp and steady from the commencement; but my eyes are actually wearied out with writing and observing.

a Such an outrageous clattering of the church bells that it is enough to make a Saint nervous.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Eleven transits . . .	7 5 10.70	—3 30.960	+5.565	=1 48.46
Mean N. P. . .	Eleven transits . . .	7 11 26.14	—3 32.062	+6.203	=2 0.90

	m. s.		h. m. s.
Correction for chronometer at 7 5 . . .	—4 36.36	Santiago sid. time S. F.	7 0 34.34
Correction for chronometer at 7 11 . . .	—4 36.38	Santiago sid. time N. P.	7 6 49.76
		Interval	6 15.42

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	16.53	Δ N. S. limbs micr. in rev.	0.638=12.44
Variation of A. R. in 6*m*. 15*s*.	— 2.15	Variation of declination in 6*m*. 15*s*. . .	+ 0.13
Observed P. F. diameter	14.38	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	10.37

h. m.	″	h. m.	″
Δ ρ at 7 2	0.11	Δ ρ at 7 9	0.12

FEBRUARY 24, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	38.8	52.0	5.0	18.0	31.2	5 56 5.00	—3.41½			27.960	65.8	60.5
2	Bessel . . . 341	. .	52.5	5.5	18.5	31.5	6 0 5.50	7.20½	—4 0.50	+3.79	Ther. att. 73°.2 Bar. red. to 32° F. 27.838		
3	Mars . . . N.P.	47.0	0.1	13.2	26.2	39.3	6 2 13.16	3.13½					
4	Bessel . . . 341	48.6	. .	15.0	27.5	. .	6 6 14.68	7.69	4 1.52	4.55½			
5	Mars . . . S.F.	32.2	45.3	58.2	11.2	24.3	6 8 58.24	3.46					
6	Bessel . . . 341	. .	46.3	59.0	12.0	24.8	6 12 59.04	7.26	4 0.80	3.80			
7	Mars . . . N.P.	32.2	45.1	58.2	11.0	24.3	6 15 58.16	3.15					
8	Bessel . . . 341	34.0	47.0	0.0	13.0	26.0	6 20 0.00	7.61½	4 1.84	4.46½			
9	Mars . . . S.F.	49.5	3.2	16.0	29.0	42.4	6 22 16.02	4.27					
10	Bessel . . . 341	. .	4.6	17.5	30.5	43.4	6 26 17.50	8.01	4 1.48	3.74			
11	Mars . . . N.P.	41.2	54.3	7.5	20.5	33.5	6 29 7.40	1.82					
12	Bessel . . . 341	. .	56.5	9.7	22.6	35.5	6 33 9.58	6.24½	4 2.18	4.42½			
13	Mars . . . S.F.	2.3	15.3	28.2	41.3	54.3	6 35 28.28	2.91					
14	Bessel . . . 341	. .	16.5	29.5	42.5	55.5	6 39 29.50	6.64	4 1.22	3.73			
15	Mars . . . N.P.	59 6	13.0	26.5	39.3	52.1	6 42 26.10	2.50½					
16	Bessel . . . 341	. .	16.0	29.0	41.8	54.7	6 46 28.88	6.95	4 2.78	4.44½			
17	Mars . . . S.F.	10.3	23.5	36.4	49.3	2.5	6 49 36.40	3.71					
18	Bessel . . . 341	12.5	25.4	38.5	51.2	4.5	6 53 38.42	7.38½	4 2.02	3.67½			
19	Mars . . . N.P.	6.5	19.3	32.0	45.0	58.0	6 55 32.16	3.44					
20	Bessel . . . 341	8.7	21.7	35.0	48.0	1.0	6 59 34.88	7.81½	4 2.72	4.40½			
21	Mars . . . S.F.	19.6	33.0	46.0	58.8	12.0	7 2 45.88	1.62½					
22	Bessel . . . 341	. .	35.3	48.1	1.0	14.0	7 6 48.10	5.36	4 2.22	3.73½			
23	Mars . . . N.P.	16.6	29.5	42.6	55.5	8.5	7 8 42.54	1.04½					
24	Bessel . . . 341	19.8	32.5	45.5	58.5	11.5	7 12 45.56	—5.42½	—4 3.02	+4.38			

FEBRUARY 24, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
25	Mars . . .	S.F.	13.3	26.4	39.5	52.4	5.5	7 14 39.42	—1.85			27.965	61.2	57.7
26	Bessel . . .	341	. .	29.0	42.0	55.0	7.7	7 18 41.94	5.57½	—4 2.52	+3.72½			
27	Mars . . .	N.P.	15.5	28.5	41.6	54.5	7.5	7 20 41.52	1.21			Ther. att. 70°.0		
28	Bessel . . .	341	. .	32.0	45.0	58.0	10.6	7 24 44.90	5.57½	4 3.38	4.36½	Bar. red. to 32° F. 27.852		
29	Mars . . .	S.F.	36.3	49.5	2.5	15.5	28.5	7 27 2.46	1.87					
30	Bessel . . .	341	. .	52.0	5.0	18.0	31.2	7 31 5.06	5.56½	4 2.60	3.69½			
31	Mars . . .	N.P.	42.0	54.3	7.3	20.3	33.5	7 33 7.48	1.18½					
32	Bessel . .	341	. .	58.5	11.5	24.3	37.5	7 37 11.46	5.57	4 3.98	4.38½			
33	Mars . . .	S.F.	47.0	0.0	13.2	26.0	39.5	7 39 13.14	1.81½					
34	Bessel . . .	341	. .	3.5	16.3	29.3	42.2	7 43 16.34	5.48	4 3.20	3.66½			
35	Mars . . .	N.P.	52.5	5.3	18.2	31.1	44.0	7 45 18.22	2.95					
36	Bessel . . .	341	56.0	9.3	22.3	35.0	48 0	7 49 22.12	7.31½	4 3.90	4.36½			
37	Mars . . .	S.F.	40.2	52.5	5.6	18.5	32.0	7 52 5.76	3.78					
38	Bessel . . .	341	43.0	56.0	9.0	22.0	35.0	7 56 9.00	7.44½	4 3.24	3.66½			
39	Mars . . .	N.P.	50.0	2.5	15.5	28.5	41.5	7 58 15.60	2.96					
40	Bessel . . .	341	54.0	7.0	20.0	32.8	45.8	8 2 19.92	7.30	4 4.32	4.34			
41	Mars . . .	S.F.	33.2	46.3	59.3	12.2	25.5	8 4 59.30	3.47½					
42	Bessel . . .	341	. .	49.8	3.0	15.8	28.5	8 9 2.80	7.10	4 3.50	3.62½			
43	Mars . . .	N.P.	22.5	35.5	48.5	1.5	14.6	8 10 48.52	2.62½					
44	Bessel . . .	341	. .	40.3	53.0	6.0	19.0	8 14 53.10	—6.91	—4 4.58	+4.28½			

Remarks.

Clean images and steady; and the measures generally are very fair. Those towards the last, for about an hour, were the most satisfactory.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Eleven transits . . .	7 1 11.81	— 4 2.118	+ 3.713 . . .	= 1 12.37
Mean N. P. . . .	Eleven transits . . .	7 11 28.26	— 4 3.111	+ 4.401 . . .	= 1 25.78

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 1 . . .	— 4 39.67	Santiago sid. time S. F.	6 56 32.14
Correction for chronometer at	7 11 . . .	— 4 39.70	Santiago sid. time N. P.	7 6 48.56
			Interval	10 16.42

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	14.89	Δ N. S. limbs micr. in rev.	0.688 = 13.41
Variation of A. R. in 10*m.* 16*s.*	— 3.15	Variation of declination in 10*m.* 16*s.* .	+ 0.28
Observed P. F. diameter	11.74	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	11.49

h. m.	″	h. m.	″
Δ ρ at 6 59	0.08	Δ ρ at 7 9	0.0

FEBRUARY 25, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 341	. .	58.8	11.6	24.6	37.6	6 4 11.65	+3.62			28.014	65.0	62.0
2	Mars . . . S.F.	14.5	27.5	40.5	53.5	6.5	6 7 40.50	—3.35	+3 28.85	—6.97			
3	Bessel . . . 341	20.5	33.3	46.4	59.4	12.4	6 9 46.40	+3.22					
4	Mars . . . N.P.	48.2	1.4	14.3	27.1	40.4	6 13 14.28	—3.04	3 27.88	6.26	Ther. att. 73°.4		
5	Bessel . . . 341	3.0	16.0	29.0	42.0	55.0	6 15 29.00	+2.85½			Bar. red. to 32° F.		
6	Mars . . . S.F.	31.5	44.5	57.5	10.5	23.6	6 18 57.52	—4.06½	3 28.52	6.92	27.891		
7	Bessel . . . 341	2.6	15.5	28.5	41.5	54.5	6 21 28.52	+2.46					
8	Mars . . . N.P.	30.4	43.3	56.3	9.2	22.5	6 24 56.34	—3.76½	3 27.82	6.22½			
9	Bessel . . . 341	31.0	43.7	57.0	9.8	22.9	6 26 56.88	+2.24					
10	Mars . . . S.F.	59.0	12.3	25.4	38.3	51.5	6 30 25.30	—4.70	3 28.42	6.94			
11	Bessel . . . 341	1.5	14.5	27.5	40.5	53.5	6 32 27.50	+1.97					
12	Mars . . . N.P.	. .	42.0	55.0	8.0	21.2	6 35 55.05	—4.27	3 27.55	6.24			
13	Bessel . . . 341	23.5	36.5	49.5	2.5	15.5	6 37 49.50	+1.84½					
14	Mars . . . S.F.	51.8	4.8	18.0	31.0	44.0	6 41 17.92	—5.13	3 28.42	6.97½			
15	Bessel . . . 341	34.2	47.2	0.3	13.3	26.3	6 44 0.26	+1.63					
16	Mars . . . N.P.	1.5	14.5	27.5	40.5	53.5	6 47 27.50	—4.67	3 27.24	6.30			
17	Bessel . . . 341	. .	28.0	41.0	54.0	7.0	6 49 41.00	+1.35					
18	Mars . . . S.F.	43.0	56.0	9.3	22.3	35.4	6 53 9.20	—5.62	3 28.20	6.97			
19	Bessel . . . 341	17.3	30.3	43.4	56.2	9.2	6 55 43.28	+1.21					
20	Mars . . . N.P.	44.2	57.1	10.2	23.0	36.1	6 59 10.12	—5.12	3 26.84	6.33			
21	Bessel . . . 341	33.5	46.5	. .	12.8	25.6	7 1 59.60	+1.03½					
22	Mars . . . S.F.	1.3	14.5	27.2	40.4	53.5	7 5 27.38	—5.90	3 27.78	6.93½			
23	Bessel . . . 341	42.5	55.5	8.4	21.5	34.5	7 7 8.48	+0.97					
24	Mars . . . N.P.	9.2	22.0	35.0	48.0	1.0	7 10 35.04	—5.31	3 26.56	6.28			
25	Bessel . . . 341	40.2	53.0	6.3	19.4	32.3	7 15 6.24	+0.92½					
26	Mars . . . S.F.	8.0	20.6	33.5	46.5	59.5	7 18 33.62	—6.08	3 27.38	7.00½			
27	Bessel . . . 341	53.0	5.8	18.8	31.7	44.5	7 20 18.76	+0.91					
28	Mars . . . N.P.	19.0	31.8	44.9	58.0	11.3	7 23 45.00	—5.41	3 26.24	6.32			
29	Bessel . . . 341	28.2	41.3	54.3	7.5	20.4	7 25 54.34	+0.84					
30	Mars . . . S.F.	55.4	8.5	21.5	34.5	47.6	7 29 21.50	—6.15	3 27.16	6.99			
31	Bessel . . . 341	46.5	59.3	12.5	25.3	38.3	7 31 12.38	+0.89					
32	Mars . . . N.P.	12.5	25.3	38.4	51.4	4.5	7 34 38.42	—5.44½	3 26.04	6.33½			
33	Bessel . . . 341	17.6	30.8	43.8	56.6	9.6	7 36 43.68	+0.95					
34	Mars . . . S.F.	44.6	57.6	10.6	23.4	36.6	7 40 10.56	—6.11	3 26.88	7.06			
35	Bessel . . . 341	41.7	54.7	7.9	21.0	33.8	7 42 7.82	+1.01½					
36	Mars . . . N.P.	7.5	20.6	33.7	46.8	59.8	7 45 33.68	—5.39	3 25.86	6.40½			
37	Bessel . . . 341	34.6	48.0	1.0	13.8	26.8	7 48 0.84	+1.13					
38	Mars . . . S.F.	1.5	14.5	27.5	40.5	53.5	7 51 27.50	—5.92	3 26.66	7.05			
39	Bessel . . . 341	8.6	21.6	34.8	47.8	0.8	7 53 34.72	+1.26					
40	Mars . . . N.P.	34.5	47.4	0.5	13.5	26.5	7 57 0.48	—5.17½	3 25.76	6.43½			
41	Bessel . . . 341	38.3	51.2	4.4	17.4	30.4	7 59 4.34	+1.40			28.000	62.4	59.5
42	Mars . . . S.F.	5.0	18.3	31.3	44.3	57.4	8 2 31.26	—5.68	3 26.92	7.08			
43	Bessel . . . 341	4.3	17.4	30.5	43.5	56.4	8 4 30.42	+1.55			Ther. att. 70°.5		
44	Mars . . . N.P.	29.7	42.6	55.8	8.6	21.7	8 7 55.68	—4.90½	3 25.26	6.45½	Bar. red. to 32° F.		
45	Bessel . . . 341	30.0	42.8	56.0	9.0	22.0	8 9 55.96	+1.75½			27.886		
46	Mars . . . S.F.	56.2	9.1	22.2	35.1	48.0	8 13 22.12	—5.38	+3 26.16	—7.13½			

FEBRUARY 25, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 341	52.5	5.5	18.6	31.5	44.5	8 15 18.52	+1.95			28.000	62.4	59.5
48	Mars . . . N.P.	17.7	30.7	43.7	56.5	9.7	8 18 43.66	—4.48½	+3 25.14	—6.43½			

Remarks.

Fine night. Well defined and steady images, and very fair measures throughout. The comparing star is double, its companion being a 12th—blue; south 19″; and following 0.4s.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Twelve transits . . .	7 11 2.03	+3 27.612	—7.002 . . .	=2 16.47
Mean N. P. . .	Twelve transits . . .	7 16 34.60	+3 26.516	—6.335 . . .	=2 3.47

	h. m.	m. s.
Correction for chronometer at	7 11 . . .	—4 43.13
Correction for chronometer at	7 17 . . .	—4 43.14

	h. m. s.
Santiago sid. time S. F.	7 6 18.90
Santiago sid. time N. P.	7 11 51.46
Interval	5 32.56

	″
Δ P. F. limbs in A. R. reduced to arc . . .	16.44
Variation of A. R. in 5m. 33s.	— 1.51
Observed P. F. diameter	14.93

	″
Δ N. S. limbs mic. in rev. . . . . . . 0.667 =	13.00
Variation of declination in 5m. 33s. . .	+ 0.18
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	10.98

	h. m.	″
Δ ρ at	7 4	0.
Δ ρ at	7 9	0.12

FEBRUARY 26, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 341	41.2	54.2	7.4	20.4	33.0	6 9 7.2	+4.90			27.920		62.9
2	Mars . . . S.F.	45.5	58.5	11.5	24.5	37.7	6 12 11.54	—4.91½	+3 4.30	—9.81½			
3	Bessel . . . 341	1.5	14.3	27.5	40.3	53.2	6 14 27.36	+4.64			Ther. att. 76°1.		
4	Mars . . . N.P.	4.5	17.5	30.5	43.5	56.5	6 17 30.50	—4.48½	3 3.14	9.12½	Bar. red. to 32° F.		
5	Bessel . . . 341	7.0	20.0	33.2	46.0	59.0	6 19 33.04	+4.35			27.790		
6	Mars . . . S.F.	11.0	24.2	37.3	50.3	3.4	6 22 37.24	—5.46½	3 4.20	9.81½			
7	Bessel . . . 341	27.4	40.4	53.5	6.5	19.3	6 24 53.42	+4 11					
8	Mars . . . N.P.	30.5	43.5	56.5	9.3	22.5	6 27 56.46	—4.99½	3 3.04	9.10½			
9	Bessel . . . 341	4.5	17.5	30.6	43.5	56.5	6 30 30.52	+3.90					
10	Mars . . . S.F.	8.5	21.5	34.5	47.5	0.5	6 33 34.50	—5.93½	3 3.98	9.83½			
11	Bessel . . . 341	17.0	30.0	43.2	56.1	9.0	6 35 43.06	+3.72					
12	Mars . . . N.P.	20.3	33.1	46.2	59.0	12.0	6 38 46.12	—5.43	3 3.06	9.15			
13	Bessel . . . 341	22.5	35.5	48.5	1.5	14.5	6 41 48.50	+3.56½					
14	Mars . . . S.F.	26.1	39.1	52.1	5.1	18.2	6 44 52.12	—6.27	3 3.62	9.83½			
15	Bessel . . . 341	19.5	32.5	45.5	58.5	11.5	6 47 45.50	+3.30					
16	Mars . . . N.P.	22.2	35.3	48.3	1.3	14.2	6 50 48.26	—5.88	3 2.76	9.18			
17	Bessel . . . 341	47.3	0.2	13.4	26.4	39.3	6 54 13.32	+3.17					
18	Mars . . . S.F.	50.5	3.5	16.5	29.7	43.0	6 57 16.64	—6.70	+3 3.32	—9.87			

FEBRUARY 26, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
19	Bessel . . . 341	8.2	21.3	34.3	47.2	0.0	6 59 34.20	+3.08½			27.886	68.0	60.1
20	Mars . . . N.P.	10.5	23.5	36.5	49.5	2.6	7 2 36.52	—6.09½	+3 2.32	—9.18			
21	Bessel . . . 341	8.5	22.0	35.0	48.0	1.0	7 4 34.90	+3.02½			Ther. att. 72°.5		
22	Mars . . . S.F.	11.9	25.1	28.2	51.0	4.4	7 7 28.12	—6.87	3 3.22	9.89½	Bar. red. to 32° F. 27.766		
23	Bessel . . . 341	24.5	38.0	51.0	4.0	16.5	7 10 50.80	+2.95					
24	Mars	27.3	40.2	53.2	6.3	19.3	7 13 53.26	—6.23½	3 2.46	9.18½			
25	Bessel . . . 341	33.5	46.5	. .	12.5	25.5	7 16 59.50	+2.92½					
26	Mars . . . S.F.	36.0	49.5	2.5	15.5	28.6	7 20 2.42	—6.98½	3 2.92	9.91			
27	Bessel . . . 341	29.0	42.3	55.3	8.1	21.0	7 22 55.14	+2.36					
28	Mars . . . N.P.	31.0	44.2	57.2	10.1	23.3	7 25 57.16	—6.93	3 2.02	9.29			
29	Bessel . . . 341	59.0	12.0	25.2	38.2	51.0	7 28 25.08	+4.10					
30	Mars . . . S.F.	1.7	15.0	28.0	41.0	54.0	7 31 27.94	—5.86	3 2.86	9.96			
31	Bessel . . . 341	27.0	40.0	53.0	6.0	19.0	7 33 53.00	+4.18½					
32	Mars . . . N.P.	28.8	41.8	54.8	7.8	20.7	7 36 54.78	—5.07	3 1.78	9.25½			
33	Bessel . . . 341	41.0	54.3	7.2	20.3	33.3	7 39 7.22	+4.27½					
34	Mars . . . S.F.	43.5	56.5	9.8	22.7	36.0	7 42 9.70	—5.75½	3 2.48	10.03			
35	Bessel . . . 341	7.5	20.5	33.5	46.5	59.6	7 45 33.52	+4.30					
36	Mars . . . N.P.	9.0	22.0	35.2	48.0	1.0	7 48 35.04	—5.00	3 1.52	9.30			
37	Bessel . . . 341	. . .	15.5	28.3	41.5	54.5	7 50 28.44	+4.46					
38	Mars . . . S.F.	4.5	17.7	31.0	43.9	56.6	7 53 30.74	—5.51	3 2.30	9.97			
39	Bessel . . . 341	51.5	4.2	17.4	30.3	43.1	7 56 17.30	+4.62					
40	Mars . . . N.P.	52.5	5.5	18.5	31.5	44.5	7 59 18.50	—4.76	3 1.20	9.38			
41	Bessel . . . 341	2.0	15.1	28.0	41.0	54.0	8 1 28.02	+4.74					
42	Mars . . . S.F.	4.0	17.0	30.2	43.3	56.5	8 4 30.20	—5.23½	3 2.18	9.97½			
43	Bessel . . . 341	52.5	5.5	18.5	31.5	44.5	8 7 18.50	+4.94½					
44	Mars . . . N.P.	54.0	7.0	20.1	32.9	46.0	8 10 20.00	—4.41	3 1.50	9.35½			
45	Bessel . . . 341	38.5	51.3	4.3	17.4	30.4	8 13 4.38	+5.10½					
46	Mars . . . S.F.	. .	. .	6.5	19.5	32.4	8 16 6.48	—4.95½	3 2.10	10.06			
47	Bessel . . . 341	8.6	21.6	34.5	47.6	0.4	8 18 34.54	+5.33					
48	Mars . . . N.P.	9.5	22.6	35.6	48.6	1.5	8 21 35.56	—4.03	+3 1.02	—9 36			

Remarks.

No finer night, better images, or more satisfactory work since the commencement of the series. The atmosphere is as steady as the earth itself. So clear is it, that not only is the companion seen distinctly under full illumination, but even its blue color is perceptible.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Twelve transits . . .	7 13 48.47	+3 3.123 . . .	—9.915 . . .	= 3 13.24
Mean N. P. . .	Twelve transits . . .	7 19 31.01	+3 2.152 . . .	—9.239 . . .	= 3 0.06

	h. m.	m. s.
Correction for chronometer at	7 14 . . .	—4 47.00
Correction for chronometer at	7 20 . . .	—4 47.01

	h. m. s.
Santiago sid. time S. F.	7 9 1.47
Santiago sid. time N. P.	7 14 44.00
Interval	5 42.53

	″
Δ P. F. limbs in A. R. reduced to arc . .	14.56
Variation of A. R. in 5*m*. 43*s*.	— 1.35
Observed P. F. diameter	13.21

	″
Δ N. S. limbs micr. in rev. . . .	0.676 = 13.17
Variation of declination in 5*m*. 43*s*. . .	+ 0.24
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	11.21

	h. m.	″
Δ ρ at	7 8	0.20
Δ ρ at	7 13	0.18

MARCH 2, 1852—Continued.														
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
93	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	—3.28			27.897	66.3	60.7
94	Mars . . . S.F.	. .	. .	23.5	. .	. .	7 52 23.48	7.76½	. . .	—4.48½			
95	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	3.23½			Ther. att. 73°.3		
96	Mars . . . N.P.	. .	. .	32.5	. .	. .	7 53 32.48	7.05	. . .	3.81½	Bar. red. to 32° F.		
97	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	3.21½			27.774		
98	Mars . . . S.F.	. .	. .	16.8	. .	. .	7 55 16.78	7.76	. . .	4.54½			
99	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	3.18					
100	Mars . . . N.P.	. .	. .	41.5	. .	. .	7 56 41.48	7.08	. . .	3.90			
101	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	3.13					
102	Mars . . . S.F.	. .	. .	31.5	.	. .	7 59 31.48	7.65	. . .	4.52			
103	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	3.07					
104	Mars . . . N.P.	. .	. .	54.3	. .	. .	8 0 54.28	6.96	. . .	3.89			
105	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	3.09					
106	Mars . . . S.F.	. .	. .	14.3	. .	. .	8 2 14.28	7.58	. . .	4.49			
107	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	3.03					
108	Mars . . . N.P.	. .	. .	26.5	. .	. .	8 3 26.48	6.93½	. . .	3.90½			
109	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	2.99½					
110	Mars . . . S.F.	. .	. .	47.0	. .	. .	8 4 46.98	7.52	. . .	4.52½			
111	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	2.90					
112	Mars . . . N.P.	. .	. .	36.3	. .	. .	8 7 36.28	6.80	. . .	3.90			
113	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	2.88					
114	Mars . . . S.F.	. .	. .	44.4	. .	. .	8 8 44.38	7.40	. . .	4.52			
115	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	2.86					
116	Mars . . . N.P.	. .	. .	1.5	. .	. .	8 10 1.48	6.77½	. . .	3.91½			
117	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	2.78½					
118	Mars . . . S.F.	. .	. .	23.5	. .	. .	8 11 23.48	7.34	. . .	4.55½			
119	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	2.79					
120	Mars . . . N.P.	. .	. .	43.0	. .	. .	8 12 43.98	—6.71	. . .	—3.92			

Remarks.

Fine night. Sharp and steady images, and satisfactory measures throughout.

Results.

		h. m. s.
Mean S. F.	Thirty transits . . .	7 19 20.57
Mean N. P.	Thirty transits . . .	7 20 51.32

Rev.		′ ″
— 4.381	. . . .	= 1 25.39
— 3.727	. . . .	= 1 12.64

	h. m.	m. s.
Correction for chronometer at	7 19 . . .	—5 1.78
Correction for chronometer at	7 21 . . .	—5 1.78

	h. m. s.
Santiago sid. time S. F.	7 14 18.79
Santiago sid. time N. P.	7 15 49.54
Interval	1 30.75

h. m.	″
Δ ρ at 7 14	0.09
Δ ρ at 7 16	0.07

	″
Δ N. S. limbs micr. in rev. 0.654	= 12.75
Variation of declination in 1*m*. 31*s*. . .	+ 0.11
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	10.66

MARCH 3, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+4.37			27.947	68.3	59.6
2	Mars . . . S.F.	. .	. .	32.0	. .	. .	6 16 31.98	—5.54	. . .	—9.91			
3	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+4.25½			Ther. att. 72°.6		
4	Mars . . . N.P.	. .	. .	42.3	. .	. .	6 18 42.28	—5.11½	. . .	9.37	Bar. red. to 32° F.		
5	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+3.97½			27.827		
6	Mars . . . S.F.	. .	. .	22.5	. .	. .	6 21 22.48	—5.96	. . .	9.93½			
7	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+3.88½					
8	Mars . . . N.P.	. .	. .	55.3	. .	. .	6 23 55.28	—5.43½	. . .	9.32			
9	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+3.71					
10	Mars . . . S.F.	. .	. .	23.2	. .	. .	6 28 23.18	—6.26	. . .	9.97			
11	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+3.59					
12	Mars . . . N.P.	. .	. .	12.1	. .	. .	6 30 12.08	—5.69½	. . .	9.28½			
13	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+3.47					
14	Mars . . . S.F.	. .	. .	53.5	. .	. .	6 32 53.48	—6.50	. . .	9.97			
15	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+3.30					
16	Mars . . . N.P.	. .	. .	49.0	. .	. .	6 34 48.98	—5.93½	. . .	9.23½			
17	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.91½					
18	Mars . . . S.F.	. .	. .	8.0	. .	. .	6 40 7.98	—7.06½	. . .	9.98			
19	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.87					
20	Mars . . . N.P.	. .	. .	51.0	. .	. .	6 42 50.98	—6.49	. . .	9.36			
21	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.74					
22	Mars . . . S.F.	. .	. .	13.3	. .	. .	6 45 13.28	—7.24	. . .	9.98			
23	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.60½					
24	Mars . . . N.P.	. .	. .	29.0	. .	. .	6 47 28.98	—6.71	. . .	9.31½			
25	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.55					
26	Mars . . . S.F.	. .	. .	28.5	. .	. .	6 50 28.48	—7.48	. . .	10.03			
27	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.38					
28	Mars . . . N.P.	. .	. .	0.0	. .	. .	6 55 59.98	—7.00	. . .	9.38			
29	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2 24½					
30	Mars . . . S.F.	. .	. .	38.0	. .	. .	7 0 37.98	—7.74½	. . .	9.99			
31	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.22½					
32	Mars . . . N.P.	. .	. .	6.0	. .	. .	7 3 5.98	—7.21	. . .	9.43½			
33	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.16					
34	Mars . . . S.F.	. .	. .	23.7	. .	. .	7 6 23.68	—7.96½	. . .	10.12½			
35	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.08					
36	Mars . . . N.P.	. .	. .	5.0	. .	. .	7 9 4.98	—7.35	. . .	9.43			
37	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+2.10					
38	Mars . . . S.F.	. .	. .	58.0	. .	. .	7 11 57.98	—8.00	. . .	10.10			
39	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+3.43					
40	Mars . . . N.P.	. .	. .	55.0	. .	. .	7 13 54.98	—6.00	. . .	9.43			
41	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+1.64					
42	Mars . . . S.F.	. .	. .	40.5	. .	. .	7 25 40.48	—8.48	. . .	10.12			
43	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+1.67					
44	Mars . . . N.P.	. .	. .	16.5	. .	. .	7 27 16.48	—7.82½	. . .	9.49½			
45	Bessel . . . 341	. .	. .	. .	. .	. .	. . . .	+1.70					
46	Mars . . . S.F.	. .	. .	40.0	. .	. .	7 28 39.98	—8.46½	. . .	—10.16½			

MARCH 3, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+1.86		·	27.953	64.0	57.4
48	Mars . . . N.P.	. .	. .	25.0	. .	. .	7 31 24.98	—7.65	. . .	—9.51			
49	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+1.83			Ther. att. 69°.6		
50	Mars . . . S.F.	. .	. .	11.0	. .	. .	7 34 10.98	—8.31	. . .	10.14	Bar. red. to 32° F. 27.841		
51 *a*	Mars . . . 341	. .	. .	. .	. .	. .	. . . . .	+1.36½					
52	Bessel . . . N.P.	. .	. .	21.0	. .	. .	7 36 20.98	—8.21	. . .	—9.57½			

Remarks.

At no time was the planet sharply defined or the star distinct. The latter, on the contrary, was faint, and the necessity of moving the micrometer screw with rapidity, in order to measure both objects near the centre of the field, made the observations unsatisfactory.

a After many trials to make the lamps burn, was obliged to desist.

Results.

		h. m. s.	Rev.		′ ″
Mean S. F. . .	Thirteen transits . .	6 54 2.46	— 10.032		= 3 15.52
Mean N. P. . .	Thirteen transits . .	6 56 32.84	— 9.395		= 3 3.11

h. m.	m. s.		h. m. s.
Correction for chronometer at 6 54 . . .	— 5 5.17	Santiago sid. time S. F.	6 48 57.29
Correction for chronometer at 6 57 . . .	— 5 5.17	Santiago sid. time N. P.	6 51 27.67
		Interval	2 30.38

	″	h. m.	″
Δ N. S. limbs micr. in rev. . . . . . 0.637 =	12.41	Δ ρ at 6 49	0.20
Variation of declination in 2*m*. 30*s*. . .	+ 0.20	Δ ρ at 6 51	0.19
Corr. for diam. of micr. wires	— 2.20		
Observed N. S. diameter	10.41		

MARCH 4, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 15401	. .	5.0	18.2	31.0	. .	6 31 18.07	—7.35			27.890	69.5	61.9
2	Mars . . . S.F.	7.8	21.0	34.0	47.0	0.0	6 33 33.96	+5.49	+2 15.89	+12.84			
3	H. C. . . . 15401	. .	14.3	27.1	40.0	. .	6 35 27.13	—7.43			Ther. att. 75°.2		
4	Mars . . . N.P.	15.5	28.6	41.7	54.5	7.5	6 37 41.56	+5.89	2 14.43	13.32	Bar. red to 32° F. 27.762		
5	H. C. . . . 15401	. .	16.5	29.5	42.5	. .	6 39 29.50	—7.62½					
6	Mars . . . S.F.	18.5	31.7	44.6	57.6	10.6	6 41 44.60	+5.16	2 15.10	12.78½			
7	H. C. . . . 15401	. .	56.0	9.0	21.6	. .	6 47 8.87	—8.25					
8	Mars . . . N.P.	56.7	10.5	23.3	36.3	49.5	6 49 23.26	+5.08	2 14.39	13.33			
9	H. C. . . . 15401	. .	5.5	18.5	31.5	. .	6 52 18.50	—8.29½					
10	Mars . . . S.F.	8.0	21.2	34.3	47.2	0.2	6 54 34.18	+4.45	2 15.68	12.74½			
11	H. C. . . . 15401	. .	56.5	9.5	22.3	. .	6 57 9.43	—8.37					
12	Mars . . . N.P.	57.5	10.6	23.6	36.5	49.5	6 59 23.54	+4.99	+2 14.11	+13.36			

MARCH 4, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
13	H. C. . . . 15401	. .	42.5	55.4	8.3	. .	7 1 55.40	—8.44			27.890	69.5	61.9
14	Mars . . . S.F.	44.5	57.5	10.5	23.5	36.6	7 4 10.52	+4.27	+2 15.12	+12.71			
15	H. C. . . . 15401	. .	18.0	31.0	44.0	. .	7 7 31.00	—8.48			Ther. att. 75°.2		
16	Mars . . . N.P.	18.9	32.5	45.5	58.5	11.5	7 9 45.38	+4.85½	2 14.38	13.33½	Bar. red. to 32° F.		
17	H. C. . . . 15401	. .	21.5	34.5	47.4	. .	7 11 34.47	—8.52			27.762		
18	Mars . . . S.F.	23.5	36.5	49.5	2.5	15.6	7 13 49.52	+4.07	2 15.05	12.59			
19	H. C. . . . 15401	. .	41.3	54.2	7.5	. .	7 15 54.33	—8.54½					
20	Mars . . . N.P.	42.5	55.5	8.5	21.6	34.5	7 18 8.52	+4.72	2 14.19	13.26½			
21	H. C. . . . 15401	. .	35.3	48.2	1.0	. .	7 21 48.17	—8.49					
22	Mars . . . S.F.	37.3	50.3	3.3	16.0	29.5	7 24 3.28	+4.09½	2 15.11	12.58½			
23	H. C. . . . 15401	. .	32.5	45.5	58.4	. .	7 25 45.47	—8.50½					
24	Mars . . . N.P.	33.0	46.5	59.5	12.5	25.5	7 27 59.40	+4.74	2 13.93	13.24½			
25	H. C. . . . 15401	. .	38.5	51.3	4.5	. .	7 31 51.43	—8.71					
26	Mars . . . S.F.	40.2	53.3	6.3	19.3	32.5	7 34 6.32	+3.92	2 14.89	12.63			
27	H. C. . . . 15401	. .	37.5	51.0	3.7	. .	7 35 50.73	—8.64					
28	Mars . . . N.P.	39.0	52.0	5.0	18.0	31.0	7 38 5.00	+4.53	2 14.27	13.17			
29	H. C. . . . 15401	. .	3.3	16.0	29.0	. .	7 41 16.10	—8.55½					
30	Mars . . . S.F.	5.0	18.2	31.2	44.0	56.8	7 43 31.04	+3.98½	2 14.94	12.54			
31	H. C. . . . 15401	. .	2.0	15.0	28.0	. .	7 45 15.00	—8.43					
32	Mars . . . N.P.	3.5	16.5	29.5	42.5	55.5	7 47 29 50	+4.73	2 14.50	13.16			
33	H. C. . . . 15401	. .	48.5	0.8	13.5	. .	7 49 0.93	—8.26½					
34	Mars . . . S.F.	49.7	2.6	15.6	28.5	42.0	7 51 15.68	+4.23	2 14.75	12.49½			
35	H. C. . . . 15401	. .	44.0	56.5	9.8	. .	7 52 56.77	—8.16½					
36	Mars . . . N.P.	45.0	58.0	11.3	24.1	37.4	7 55 11.16	+5.00	2 14.39	13.16½			
37	H. C. . . . 15401	. .	34.0	47.2	0.2	. .	7 56 47.13	—8.01					
38	Mars . . . S F.	36.0	49.0	2.0	15.0	28.3	7 59 2.06	+4.49½	2 14.93	12.50½			
39	H. C. . . . 15401	. .	43.5	56.5	9.3	. .	8 0 56.43	—7.93			27.986	65.8	60.2
40	Mars . . . N.P.	44.5	57.5	10.5	23.5	36.5	8 3 10.50	+5.18	2 14.07	13.11			
41	H. C. . . . 15401	. .	42.5	56.0	9.0	. .	8 4 55.83	—7.73			Ther. att. 73°.0		
42	Mars . . . S.F.	45.0	58.3	11.1	24.0	37.2	8 7 11.12	+4.71	2 15.29	12.44	Bar. red. to 32° F.		
43	H. C. . . . 15401	. .	34.0	47.0	0.0	. .	8 8 47.00	—7.58			27.864		
44	Mars . . . N.P.	. .	48.5	1.5	14.3	27.4	8 11 1.44	+5.47	+2 14.44	+13.05			

Remarks.

Night fine, images steady, and measures satisfactory throughout.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Eleven transits . . .	7 22 27.48	+2 15.159	+12.624 . . .	=4 6.04
Mean N. P. . .	Eleven transits . . .	7 27 1.75	+2 14.282	+13.228 . . .	=4 17.81

h. m.	m. s.
Correction for chronometer at 7 22 . . .	—5 8.67
Correction for chronometer at 7 27 . . .	—5 8.68

	h. m. s.
Santiago sid. time S. F.	7 17 18.81
Santiago sid. time N. P.	7 21 53.07
Interval	4 34.26

	″
Δ P. F. limbs in A. R. reduced to arc . .	13.15
Variation of A. R. in 4*m*. 34*s*.	+ 0.01
Observed P. F. diameter	13.16

	″
Δ N. S. limbs micr. in rev.	0.604 = 11.77
Variation of declination in 4*m*. 34*s*. . .	+ 0.39
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	9.96

h. m.	″
Δ ρ at 7 16	0.25
Δ ρ at 7 21	0.26

MARCH 5, 1852.

Clouds until planet had passed the meridian.

MARCH 6, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 15401	. .	34.2	47.2	0.2	. .	6 50 47.20	+4.90½			27.924	70.0	58.9
2	Mars . . . S F.	42.5	56.0	9.0	22.0	35.0	6 53 8.90	4.12	+2 21.70	—0.78½			
3	H. C. . . . 15401	. .	49.6	2.6	15.6	. .	6 55 2.60	4.87			Ther. att. 72°.0		
4	Mars . . . N P.	. .	10.5	23.5	36.5	49.5	6 57 23.51	4.60	2 20.91	0.27	Bar. red. to 32° F. 27.805		
5	H. C. . . . 15401	. .	36.6	49.5	2.6	. .	6 58 49.57	4.78					
6	Mars . . . S.F.	45.3	58.3	11.2	24.4	37.4	7 1 11.32	3.93½	2 21.75	0.84½			
7	H. C. . . . 15401	. .	51.5	4.5	17.5	. .	7 3 4.50	4.63½					
8	Mars . . . N.P.	59.5	12.6	25.5	38.5	51.5	7 5 25.52	4.41½	2 21.02	0.22			
9	H. C. . . . 15401	. .	26.5	39.6	52.6	. .	7 7 39.57	4.63					
10	Mars . . . S.F.	35.5	. .	1.7	14.6	27.6	7 10 1.61	3.70	2 22.04	0.93			
11	H. C. . . . 15401	. .	37.0	50.0	3.0	. .	7 11 50.00	4.66					
12	Mars . . . N.P.	44.5	58.0	11.0	23.7	37.0	7 14 10.84	4.31½	2 20.84	0.34½			
13 a	H. C. . . . 15401	. .	54.0	7.0	19.8	. .	7 16 6.93	4.61					
14	Mars . . . S.F.	2.5	15.7	. .	41.6	54.6	7 18 28.60	3.60½	2 21.67	1.00½			
15	H. C. . . . 15401	. .	14.6	27.6	40.6	. .	7 20 27.60	4.55					
16	Mars . . N.P.	22.5	35.5	48.5	1.5	14.5	7 22 48.50	4.21½	2 20.90	0.33½			
17 b	H. C. . . . 15401	. .	36.0	49.0	2.0	. .	7 24 49.00	4.55					
18	Mars . . . S.F.	44.5	57.5	10.5	23.5	36.5	7 27 10.50	3.52½	2 21.50	1.02½			
19	H. C. . . . 15401	. .	36.5	49.5	2.5	. .	7 29 49.50	4.42½					
20	Mars . . . N.P.	44.3	57.4	10.5	23.4	36.5	7 32 10.42	4.07½	2 20.92	0.35			
21	H. C. . . . 15401	. .	57.6	11.0	23.6	. .	7 34 10.73	4.46½					
22	Mars . . . S.F.	6.6	. .	32.6	45.6	58.6	7 36 32.61	3.48½	2 21.88	0.98			
23	H. C. . . . 15401	. .	12.0	25.0	37.8	. .	7 38 24.93	4.52½					
24	Mars . . . N.P.	19.8	32.8	46.0	58.8	11.7	7 40 45.82	4.07½	2 20.89	0.45			
25	H. C. . . . 15401	. .	43.7	56.6	9.4	. .	7 42 56.57	4.54					
26	Mars . . . S.F.	52.5	5.5	18.5	31.5	44.5	7 45 18.50	3.49	2 21.93	1.05			
27	H. C. . . . 15401	. .	53.8	7.0	20.0	. .	7 47 6.93	4.66½					
28	Mars . . . N.P.	2.0	15.0	28.0	41.0	54.2	7 49 28.04	4.18	2 21.11	0.48½			
29 c	H. C. . . . 15401	. .	50.3	3.2	16.1	. .	7 51 3.20	4.70					
30	Mars . . . S.F.	58.8	12.0	25.0	38.0	51.2	7 53 25.00	3.58	2 21.80	1.12			
31	H. C. . . . 15401	. .	49.0	2.0	15.0	. .	7 55 2.00	4.83½					
32	Mars . . . N.P.	57.0	10.0	23.0	36.0	48.9	7 57 22.98	4.31	2 20.98	0.52½			
33	H. C. . . . 15401	. .	44.5	57.5	10.5	. .	7 58 57.50	4.92½					
34	Mars . . . S.F.	53.3	6.3	19.6	32.6	45.6	8 1 19.48	3.74	2 21.98	1.18½			
35	H. C. . . . 15401	. .	40.6	53.6	6.5	. .	8 2 53.57	5.02½					
36	Mars . . . N.P.	48.5	1.7	14.7	27.7	40.7	8 5 14.66	4.50½	2 21.09	0.52			
37	H. C. . . . 15401	. .	30.0	43.2	56.0	. .	8 6 43.07	5.15					
38	Mars . . . S.F.	38.7	51.8	5.0	18.2	31.2	8 9 4.98	3.91	2 21.91	1.21			
39	H. C. . . . 15401	. .	14.6	27.6	40.6	. .	8 11 27.60	5.33					
40	Mars . . . N.P.	22.6	35.5	48.6	1.6	14.6	8 13 48.58	4.77½	2 20.98	0.58½			
41	H. C. . . . 15401	. .	2.0	15.0	27.8	. .	8 15 14.93	5.55					
42	Mars . . . S F.	10.8	23.8	36.8	49.8	3.0	8 17 36.84	+4.30	+2 21.91	—1.25			

MARCH 6, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
43	H. C. . . . 15401	. .	9.5	22.6	35.8	. .	8 19 22.63	+5.72½			27.935	65.0	58.8
44	Mars . . . N.P.	17.5	30.6	43.6	56.3	9.5	8 21 43.50	5.09	+2 20.87	—0.63½			
45	H. C. . . . 15401	. .	4.5	17.5	30.5	. .	8 23 17.50	5.97½			Ther. att. 71°. 0		
46 *d*	Mars . . . S.F.	13.5	26.5	39.5	52.5	3.5	8 25 39.10	4.67	2 21.60	1.30½	Bar. red. to 32° F.		
47	H. C. . . . 15401	. .	5.3	17.9	31.0	. .	8 27 18.04	6.16			27.819		
48	Mars . . . N.P.	13.3	26.3	39.3	52.3	5.2	8 29 39.26	+5.46½	+2 21.22	—0.69½			

Remarks.

Blurred and unsteady at the commencement; and though sharper and pretty well defined subsequently, never entirely free from irregular motion.

a Better. *b* Tolerably good. *c* Recorded 26*m*. 1*s*. at wire D. *d* Blurred again.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Twelve transits . .	7 39 54.79	+2 21.806 . . .	—1.057 . . .	=0 20.60
Mean N. P. . .	Twelve transits . .	7 44 10.14	+2 20.977 . . .	—0.451 . . .	=0 8.79

	m. s.		h. m. s.
Correction for chronometer at 7 40 (h. m.) . . .	—5 14.32	Santiago sid. time S. F.	7 34 40.47
Correction for chronometer at 7 44 . . .	—5 14.32	Santiago sid. time N. P.	7 38 55.82
		Interval	4 15.35

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	12.43	Δ N. S. limbs micr. in rev.	0.606 = 11.81
Variation of A. R. in 4*m*. 15*s*.	+ 0.29	Variation of declination in 4*m*. 15*s*. .	+ 0.41
Observed P. F. diameter	12.72	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	10.02

h. m.	″	h. m.	″
Δ ρ at 7 34	0.02	Δ ρ at 7 38	0.01

MARCH 7, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 15412	. .	6.0	19.0	32.0	. .	6 45 19.00	—7.27			27.954	65.6	57.3
2	Mars . . . S.F.	2.5	. .	28.5	41.3	54.5	6 47 28.46	+9.32½	+2 9.46	+16.59½			
3	H. C. . . . 15412	. .	26.8	39.8	52.8	. .	6 49 39.80	—7.60½			Ther. att. 70°.2		
4	Mars . . . N.P.	22.6	35.5	48.5	1.5	14.6	6 51 48.54	+9.65	2 8.74	17.25½	Bar. red. to 32° F.		
5	H. C. . . . 15412	. .	30.3	43.3	56.1	. .	6 53 43.23	—7.60½			27.841		
6	Mars . . . S.F.	26.3	39.3	52.3	5.5	18.8	6 55 52.44	+8.94½	2 9.21	16.55			
7	H. C. . . . 15412	. .	41.2	54.3	7.3	. .	6 57 54.27	—7.78½					
8	Mars . . . N.P.	37.1	50.2	3.2	16.0	28.5	7 0 3.00	+9.43	2 8.73	17.21½			
9	H. C. . . . 15412	. .	59.8	12.6	25.6	. .	7 2 12.67	—7.87					
10	Mars . . . S.F.	56.0	9.2	22.1	35.0	48.3	7 4 22.12	+8.74	2 9.45	16.61			
11	H. C. . . . 15412	. .	4.5	17.6	30.6	. .	7 7 17.57	—7.99½					
12	Mars . . . N.P.	0.5	13.7	26.8	39.6	52.7	7 9 26.66	+9.16	+2 9.09	+17.15½			

MARCH 7, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
13	H. C. . . . 15412	. .	40.6	53.5	6.5	. .	7 11 53.53	—8.00			27.954	65.6	57.3
14	Mars . . . S.F.	. .	50.5	3.5	16.4	29.5	7 14 3.49	+8.45	+2 9.96	+16.45			
15	H. C. . . . 15412	. .	48.6	1.5	14.5	. .	7 16 1.53	—8.05			Ther. att. 70°.2 Bar. red. to 32° F. 27.841		
16	Mars . . . N.P.	44.4	57.5	10.5	23.5	36.5	7 18 10.48	+9.10	2 8.95	17.15			
17	H. C. . . . 15412	. .	11.3	24.5	37.3	. .	7 20 24.37	—8.00½					
18	Mars . . . S.F.	8.2	21.2	. .	47.5	0.5	7 22 34.35	+8.42½	2 9.98	16.43			
19	H. C. . . . 15412	. .	26.8	38.8	52.0	. .	7 24 39.20	—8.05					
20	Mars . . . N.P.	22.8	35.7	48.5	1.3	14.6	7 26 48.58	+8.96	2 9.38	17.01			
21	H. C. . . . 15412	. .	12.5	25.2	38.0	. .	7 29 25.23	—8.47½					
22	Mars . . . S.F.	8.5	21.8	35.0	47.6	1.0	7 31 34.78	+7.95	2 9.55	16.42½			
23	H. C. . . . 15412	. .	44.5	57.5	10.5	. .	7 33 57.50	—8.38			27.967	61.8	55.4
24	Mars . . . N.P.	40.8	53.8	6.9	20.0	33.0	7 36 6.90	+8.58	2 9.40	16.96			
25	H. C. . . . 15412	. .	52.3	5.1	18.2	. .	8 18 5.20	—7.13			Ther. att. 67°.6 Bar. red. to 32° F. 27.862		
26	Mars . . . S.F.	49.3	1.3	15.4	28.2	41.3	8 20 15.10	+8.99½	2 9.99	16.12½			
27 a	H. C. . . . 15412	. .	57.7	11.0	24.0	. .	8 22 10.90	—6.94½					
28	Mars . . . N.P.	53.7	7.0	20.0	33.3	46.1	8 24 20.02	+9.85	+2 9.12	+16.79½			

Remarks.

Never sharp during the evening; moreover, there was constantly a quick, tremulous motion, different from anything heretofore noted.

a Blurred, so as to be indistinct.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F.	Seven transits . .	7 19 27.25	+2 9.657	+ 16.455 . . .	= 5 20.71
Mean N. P.	Seven transits . .	7 23 49.17	+2 9.059	+ 17.077 . . .	= 5 32.83

	m. s.		h. m. s.
Correction for chronometer at 7 19 (h. m.) . . .	— 5 17.25	Santiago sid. time S. F.	7 14 10.00
Correction for chronometer at 7 24 . . .	— 5 17.24	Santiago sid time N. P.	7 18 31.93
		Interval	4 21.93

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	8.97	Δ N. S. limbs micr. in rev.	0.622 = 12.12
Variation of A. R. in 4*m*. 22*s*.	+ 0.43	Variation of declination in 4*m*. 22*s*. . .	+ 0.44
Observed P. F. diameter	9.40	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	10.36

h. m.	″	h. m.	″
Δ ρ at 7 13	0.32	Δ ρ at 7 17	0.33

MARCH 8, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 15412	. .	30.5	43.5	56.4	. .	6 29 43.47	—5.11			28.035	62.5	54.3
2	Mars . . . S.F.	37.5	50.5	3.5	16.5	29.6	6 32 3.52	+3.79	+2 20.05	+8.90	Ther. att. 68°.0 Bar. red. to 32° F. 27.928		
3	H. C. . . . 15412	. .	43.6	56.6	9.5	. .	6 38 56.57	—5.00					
4	Mars . . . N.P.	50.0	3.0	16.3	29.0	42.0	6 41 16.06	+4.48½	+2 19.49	+9.48½			

MARCH 8, 1852—Continued.														
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
5	H. C. . . . 15412	. .	5.3	18.3	31.1	. .	6 43 18.23	—5.09			28.035	62.5	54.3
6	Mars . . . S.F.	12.9	26.0	39.0	52.0	5.0	6 45 38.98	+3.72	+2 20.75	+8.81			
7	H. C. . . . 15412	. .	35.8	48.6	1.5	. .	6 47 48.63	—4.75½			Ther. att. 68°.0		
8	Mars . . . N.P.	42.3	55.3	8.5	21.2	34.3	6 50 8.32	+4.62	2 19.69	9.37½	Bar. red. to 32° F. 27.928		
9	H. C. . . . 15412	. .	0.8	13.6	26.4	. .	6 53 13.60	—4.92					
10	Mars . . . S.F.	8.2	21.4	34.3	47.3	0.5	6 55 34.34	+3.91	2 20.74	8.83			
11	H. C. . . . 15412	. .	39.5	52.6	5.4	. .	6 57 52.50	—5.02					
12	Mars . . . N.P.	46.0	59.0	12.1	25.0	38.0	7 0 12.02	+4.41	2 19.52	9.43			
13	H. C. . . . 15412	. .	27.0	40.0	52.8	. .	7 3 39.93	—5.16					
14	Mars . . . S.F.	34.6	47.5	0.5	13.6	26.5	7 6 0.54	+3.60½	2 20.61	8.76½			
15	H. C. . . . 15412	. .	33.5	46.6	59.5	. .	7 8 46.53	—5.19					
16 *a*	Mars . . . N.P.	41.0	53.6	7.0	19.9	33.2	7 11 6.94	+4.18	2 20.41	9.37			
17	H. C. . . . 15412	. .	7.2	20.3	33.6	. .	7 13 20.37	—5.22½					
18	Mars . . . S.F.	15.2	28.3	41.3	54.3	7.5	7 15 41.32	+3.48	2 20.95	8.70½			
19	H. C. . . . 15412	. .	11.6	24.5	37.4	. .	7 17 24.50	—5.23					
20	Mars . . . N.P.	. .	32.1	45.0	58.0	11.0	7 19 45.04	+4.06	2 20.54	9.29			
21	H. C. . . . 15412	. .	28.6	41.5	54.4	. .	7 21 41.50	—5.26					
22	Mars . . . S.F.	36.6	49.5	2.5	15.5	28.5	7 24 2.52	+3.33½	2 21.02	8.59½			
23	H. C. . . . 15412	. .	4.3	17.2	30.2	. .	7 26 17.23	—5.24					
24	Mars . . . N.P.	11.3	24.4	37.4	50.3	3.2	7 28 37.32	+3.96½	2 20.09	9.20½			
25	H. C. . . . 15412	. .	24.8	37.7	50.7	. .	7 31 37.73	—5.20					
26	Mars . . . S.F.	32.2	45.3	58.4	11.1	24.5	7 33 58.30	+3.40½	2 20.57	8.60½			
27	H. C. . . . 15412	. .	51.5	4.5	17.3	. .	7 36 4.43	—5.15½					
28	Mars . . . N.P.	58.2	11.2	24.5	37.3	50.4	7 38 24.32	+4.04	2 19.89	9.19½			
29	H. C. . . . 15412	. .	14.0	27.0	39.9	. .	7 40 26.97	—5.07½					
30	Mars . . . S.F.	21.6	34.6	47.5	0.6	13.6	7 42 47.58	+3.44	2 20.61	8.51½			
31	H. C. . . . 15412	. .	25.0	38.0	50.8	. .	7 44 37.93	—5.00½					
32	Mars . . . N.P.	31.6	44.6	58.0	10.5	23.5	7 46 57.64	+4.12½	2 19.71	9.13			
33	H. C. . . . 15412	. .	6.5	19.5	32.3	. .	7 49 19.41	—4.94					
34	Mars . . . S.F.	14.0	27.0	40.1	53.0	6.3	7 51 40.08	+3.55	2 20.67	8.49			
35	H. C. . . . 15412	. .	17.5	30.3	43.3	. .	7 53 30.37	—4.86					
36	Mars . . . N.P.	24.5	37.5	50.5	3.5	16.5	7 55 50.50	+4.27	2 20.13	9.13			
37	H. C. . . . 15412	. .	50.0	3.0	15.8	. .	7 58 2.93	—4.69					
38	Mars . . . S.F.	57.6	10.7	23.7	36.5	49.8	8 0 23.66	+3.75	2 20.73	8.44			
39	H. C. . . . 15412	. .	48.4	1.3	14.3	. .	8 2 1.33	—4.55					
40	Mars . . . N.P.	55.5	8.5	21.4	34.4	47.5	8 4 21.46	+4.49	2 20.13	9.04			
41	H. C. . . . 15412	. .	1.0	14.0	27.0	. .	8 6 14.00	—4.40					
42	Mars . . . S.F.	9.2	22.5	35.3	48.3	1.3	8 8 35.32	+4.02	2 21.32	8.42			
43	H. C. . . . 15412	. .	1.0	14.0	26.8	. .	8 10 13.93	—4.25½			28.047	56.2	51.7
44	Mars . . . N.P.	8.2	21.0	34.4	47.2	0.2	8 12 34.20	+4.75½	2 20.27	9.01			
45	H. C. . . . 15412	. .	0.8	14.0	26.8	. .	8 14 13.87	—4.09			Ther. att. 66°.0		
46	Mars . . . S.F.	9.0	22.0	35.3	48.2	1.2	8 16 35.14	+4.24	2 21.27	8.33	Bar. red. to 32° F. 27.946		
47	H. C. . . . 15412	. .	4.6	17.8	30.6	. .	8 18 17.67	—3.91½					
48 *b*	Mars . . . N.P.	11.6	24.5	37.5	50.5	4.0	8 20 37.62	+5.03½	+2 19.95	+8.95			

FEBRUARY 27, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	341	. .	32.2	45.0	57.5	10.6	7 15 44.84	+6.20½			27.856	65.2	60.2
2	Mars . . .	S.F.	0.5	13.7	26.7	29.7	53.0	7 18 26.72	—7.24½	+2 41.88	—13.45			
3	Bessel . . .	341	23.2	35.6	48.7	1.6	14.5	7 20 48.72	+5.82½			Ther. att. 73°.0 Bar. red. to 32° F. 27.734		
4	Mars . . .	N.P.	4.0	17.2	30.3	43.1	56.3	7 23 30.18	—6.78½	2 41.46	12.61			
5	Bessel . . .	341	23.0	36.0	49.0	2.3	15.3	7 25 49.12	+5.87					
6	Mars . . .	S.F.	5.2	18.3	31.3	44.3	57.4	7 28 31.30	—7.44½	2 42.18	13.31½			
7	Bessel . . .	341	7.7	21.0	33.8	46.9	0.0	7 30 33.88	+5.95					
8	Mars . . .	N.P.	48.7	1.5	14.8	27.8	41.0	7 33 14.76	—6.68½	2 40.88	12.63½			
9	Bessel . . .	341	43.0	56.0	9.0	22.0	35.0	7 37 9.00	+5.96½					
10	Mars . . .	S.F.	24.7	37.8	51.0	3.8	17.0	7 39 50.86	—7.31½	2 41.86	13.28			
11	Bessel . . .	341	55.5	8.5	21.5	34.7	47.5	7 42 21.54	+6.06					
12	Mars . . .	N.P.	36.5	49.5	2.6	15.5	28.6	7 45 2.54	—6.62½	2 41.00	12.68½			
13	Bessel . . .	341	41.8	55.0	8.0	21.0	34.0	7 48 7.96	+6.18					
14	Mars . . .	S.F.	23.5	36.8	49.8	2.7	16.0	7 50 49.76	—7.17½	2 41.80	13.35½			
15	Bessel . . .	341	23.1	36.0	49.0	2.3	15.2	7 52 49.12	+6.26½					
16	Mars . . .	N.P.	3.7	16.7	29.8	42.7	55.6	7 55 29.70	—6.43½	2 40.58	12.70			
17	Bessel . . .	341	28.0	40.5	53.7	6.5	19.6	7 57 53.66	+6.31½					
18	Mars . . .	S.F.	8.5	21.6	34.9	48.0	1.3	8 0 34.86	—7.00½	2 41.20	13.32			
19	Bessel . . .	341	10.5	23.5	36.5	49.5	2.5	8 2 36.50	+6.49					
20	Mars . . .	N.P.	51.0	4.0	17.0	30.0	43.0	8 5 17.00	—6.23½	2 40.50	12.72½			
21	Bessel . .	341	40.5	53.5	6.5	19.5	32.5	8 7 6.50	+6.65½					
22	Mars . . .	S.F.	21.7	34.6	47.5	0.6	13.6	8 9 47.60	—6.79	2 41.10	13.44½			
23	Bessel . . .	341	17.2	30.3	43.3	56.2	9.0	8 11 43.20	+6.81					
24	Mars . . .	N P.	57.5	10.5	23.5	36.5	49.5	8 14 23.50	—5.93½	2 40.30	12.74½			
25	Bessel . . .	341	22.0	35.0	48.0	1.0	13.8	8 16 47.96	+7.09					
26	Mars . . .	S.F.	3.0	16.1	29.0	42.0	55.3	8 19 29.08	—6.34½	2 41.12	13.43½			
27	Bessel . . .	341	8.4	21.3	34.5	47.4	0.5	8 21 34.42	+7.31					
28	Mars . . .	N.P.	48.6	1.5	14.6	27.5	40.5	8 24 14.54	—5.48	2 40.12	12.79			
29	Bessel . . .	341	48.5	1.0	14.3	27.2	40.2	8 26 14.24	+7.52½					
30	Mars . .	S.F.	29.0	42.2	55.1	8.0	21.3	8 28 55.12	—5.95	2 40.88	13.47½			
31	Bessel . . .	341	12.5	25.6	38.6	51.6	4.5	8 31 38.56	+7.77					
32	Mars . . .	N.P.	53.0	6.0	18.8	31.7	45.0	8 34 18.90	—5.03½	2 40.34	12.80½	27.836	63.4	58.4
33	Bessel . . .	341	47.1	0.2	13.0	26.5	40.0	8 36 13.36	+8.07					
34	Mars . . .	S.F.	28.5	41.5	54.5	7.5	20.5	8 38 54.50	—5.42½	2 41.14	13.49½	Ther. att. 71°.2 Bar. red. to 32° F. 27.720		
35	Bessel . . .	341	36.5	49.6	2.5	15.5	29.0	8 41 2.62	+8.38					
36	Mars . . .	N.P.	16.5	29.7	42.8	55.7	8.7	8 43 42.68	—4.47	+2 40.06	—12.85			

Remarks.

Same remarks applicable as last night. Immersion of ε Tauri, per chronometer, at 6*h*. 50*m*. 33*s*.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Nine transits . . .	7 59 28.87	+2 41.462 . . .	—13.397	=4 21.11
Mean N. P. . .	Nine transits . . .	8 4 48.20	+2 40.582 . . .	—12.727	=4 8.05

FEBRUARY 27, 1852—Continued.

Results—Continued.

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 59	—4 50.40	Santiago sid. time S. F.	7 54 38.47
Correction for chronometer at	8 5	—4 50.41	Santiago sid. time N. P.	8 59 57.79
			Interval	5 19.32

	″		″
Δ P. F. limbs in A. R. reduced to arc	13.20	Δ N. S. limbs micr. in rev.	0.670 = 13.06
Variation of A. R. in 5*m*. 19*s*.	— 1.01	Variation of declination in 5*m*. 19*s*.	+ 0.26
Observed P. F. diameter	12.19	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	11.12

	h. m.	″		h. m.	″
Δ ρ at	7 52	0.26	Δ ρ at	7 59	0.25

FEBRUARY 28, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel	341	. .	18.5	31.3	. .	. .	6 31 31.37	—3.58½			27.911	60.3	59.0
2	Mars	S.F.	. .	11.5	24.5	38.0	. .	6 32 24.66	+6.73	+53.29	+10.31½			
3	Bessel	341	. .	8.3	21.3	. .	. .	6 34 21.27	—3.70			Ther. att. 69°.9		
4	Mars	N.P.	. .	0.5	13.5	26.0	. .	6 35 13.33	+7.28½	52.06	10.98½	Bar. red. to 32° F. 27.799		
5	Bessel	341	. .	. .	58.0	. .	. .	6 38 57.98	—3.80					
6	Mars	S.F.	. .	37.8	51.0	4.0	. .	6 39 50.93	+6.42½	52.95	10.22½			
7	Bessel	341	. .	. .	37.0	. .	. .	6 41 36.98	—3.87½					
8	Mars	N.P.	. .	17.0	30.2	43.0	. .	6 42 30.07	+7.03	53.09	10.90½			
9	Bessel	341	. .	. .	59.3	. .	. .	6 45 59.28	—3.97					
10	Mars	S.F.	. .	39.0	52.0	4.8	. .	6 46 51.93	+6.19½	52.65	10.16½			
11	Bessel	341	. .	. .	20.5	. .	. .	6 49 20.48	—4.09½					
12	Mars	N.P.	. .	59.6	12.8	25.8	. .	6 51 12.73	+6.75½	52.25	10.85			
13	Bessel	341	. .	. .	26.0	. .	. .	6 53 25.98	—4.30½					
14	Mars	S.F.	. .	6.0	18.8	31.7	. .	6 54 18.83	+5.89½	52.85	10.20			
15	Bessel	341	. .	. .	8.5	. .	. .	6 59 8.48	—4.43½					
16	Mars	N.P.	. .	48.7	1.7	. .	. .	7 0 1.68	+6.37½	53.20	10.81			
17	Bessel	341	. .	. .	19.5	. .	. .	7 2 19.48	—4.50					
18	Mars	S.F.	. .	59.3	12.3	. .	. .	7 3 12.28	+5.70	52.80	10.20			
19	Bessel	341	. .	. .	43.0	. .	. .	7 4 42.98	—4.49½					
20	Mars	N.P.	. .	22.0	35.0	48.0	. .	7 5 35.00	+6.36	52.02	10.85½			
21 *a*	Bessel	341	. .	. .	19.5	. .	. .	7 9 19.48	—4.50½					
22	Mars	S.F.	. .	59.2	12.5	25.5	. .	7 10 12.40	+5.62½	52.92	10.13			
23	Bessel	341	. .	. .	27.0	. .	. .	7 12 26.98	—4.39					
24	Mars	N.P.	. .	5.0	18.0	30.8	. .	7 13 17.93	+6.31½	50.95	10.70½			
25	Bessel	341	. .	. .	2.5	. .	. .	7 16 2.48	—4.41					
26	Mars	S.F.	. .	41.5	54.5	7.5	. .	7 16 54.50	+5.56	52.02	9.97			
27 *b*	Bessel	341	. .	. .	57.5	. .	. .	7 19 57.48	—4.59½					
28	Mars	N.P.	. .	. .	49.0	1.5	. .	7 20 48.76	+6.24	51.28	10.83½			
29 *c*	Bessel	341	. .	. .	57.5	. .	. .	7 59 57.48	—5.12					
30	Mars	S.F.	. .	36.8	49.2	2.4	. .	8 0 49.47	+4.89	51.99	10.01			
31	Bessel	341	. .	. .	6.0	. .	. .	8 3 5.98	—5.01½					
32	Mars	N.P.	. .	44.5	56.5	9.5	. .	8 3 56.83	+5.66½	50.85	10.68			
33	Bessel	341	. .	. .	58.4	. .	. .	8 5 58.38	—4.27½					
34	Mars	S.F.	. .	36.5	49.4	2.3	. .	8 6 49.40	+5.71½	+51.02	+9.99			

FEBRUARY 28, 1852—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
35	Bessel . . .	341	. .	. .	1.5	. .	. .	8 9 1.48	—4.18			27.916	57.5	57.0
36	Mars . . .	N.P.	. .	39.0	52.2	5.0	. .	8 9 52.07	+6.41	+50 59	+10.59			
37	Bessel . . .	341	. .	. .	20.0	. .	. .	8 11 19.98	—4.09			Ther. att. 67°.6 Bar. red. to 32° F. 27.810		
38	Mars . . .	S.F.	. .	58.5	11.5	24.4	. .	8 12 11.47	+5.94½	51.49	10.03½			
39	Bessel . . .	341	. .	. .	44.5	. .	. .	8 13 44.48	—3.97					
40	Mars . . .	N.P.	. .	21.6	34.5	47.5	. .	8 14 34.53	+6.71	50.05	10.68			
41	Bessel . . .	341	. .	. .	51.2	. .	. .	8 16 51.18	—3.83					
42	Mars . . .	S.F.	. .	29.8	42.5	55.6	. .	8 17 42.63	+6.15	51.45	9.98			
43	Bessel . . .	341	. .	. .	30.0	. .	. .	8 20 29.98	—3.68					
44	Mars . . .	N.P.	. .	7.0	20.0	32.9	. .	8 21 19.97	+6.98½	49.99	10.66½			
45 *d*	Bessel . . .	341	. .	. .	2.7	. .	. .	8 23 2.68	—3.47					
46	Mars . . .	S.F.	. .	41.0	54.3	7.0	. .	8 23 54.10	+6.51½	51.42	9.98½			
47	Bessel . . .	341	. .	. .	20.5	. .	. .	8 25 20.48	—3.42½					
48	Mars . . .	N.P.	. .	57.5	10.5	23.5	. .	8 26 10.50	+7.24	50.02	10.66½			
49	Bessel . . .	341	. .	. .	18.4	. .	. .	8 27 18.38	—3.32					
50	Mars . . .	S.F.	. .	56.6	9.6	22.6	. .	8 28 9.60	+6.70½	51.22	10.02½			
51	Bessel . . .	341	. .	. .	21.0	. .	. .	8 29 20.98	—3.21					
52	Mars . . .	N.P.	. .	59.0	12.0	25.0	. .	8 30 12.00	+7.43	+51.02	+10.64			

Remarks.

Very much blurred and indistinct, so that satisfactory measures cannot be made.

a Recorded 20.5*s*.

b So much blurred, it is not easy to estimate contact.

c Rather sharper; but there was a flickering motion during the remainder of the observations, which prevented good work.

d Recorded 22*m*. 57.7*s*.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F. . .	Seven transits . . .	6 54 49.36	+52.783	+10.172 . . .	=3 18.25
Mean N. P. . .	Seven transits . . .	6 58 22.79	52.121	10.849 . . .	3 31.45
Mean S. F. . .	Six transits	8 14 56.11	51.432	10.004 . . .	3 14.98
Mean N. P. . .	Six transits	8 17 40.98	+50.420	+10.653 . . .	=3 27.63

h. m.	m. s.	h. m.	m. s.
Correction for chronometer at 6 55	—4 53.51	Correction for chronometer 8 15	—4 53.69
Correction for chronometer at 6 58 . . .	—4 53.51	Correction for chronometer 8 18	—4 53.69
	h. m. s.		h. m. s.
Santiago sid. time S. F.	6 49 55.85	Santiago sid. time S. F.	8 10 2.42
Santiago sid. time N. P.	6 53 29.28	Santiago sid. time N. P.	8 12 47.29
Interval	3 33.43	Interval	2 44.87
	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	9.93	Δ N. S. limbs micr. in rev.	0.677 = 13.19
Variation of A. R. in 3*m*. 33*s*.	— 0.59	Variation of declination in 3*m*. 33*s*. . .	+ 0.20
Observed P. F. diameter	9.34	Corr. for diameter of micr. wires . .	— 2.20
		Observed N. S. diameter	11.19
	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	15.18	Δ N. S. limbs micr. in rev.	0.649 = 12.65
Variation of A. R. in 2*m*. 45*s*.	— 0.46	Variation of declination in 2*m*. 45*s*. . .	+ 0.15
Observed P. F. diameter	14.72	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	10.60
h. m.	″	h. m.	″
Δ ρ at 6 49	0.21	Δ ρ at 8 10	0.19
Δ ρ at 6 53	0.22	Δ ρ at 8 12	0.21

FEBRUARY 29, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δα	Δδ	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . . 341	. .	. .	52.6	. .	. .	6 34 52.58	—3.58			27.961	57.0	55.4
2 a	Mars . . . S.F.	. .	. .	31.0	44.0	. .	6 35 31.01	+2.36	+38.43	+5.94			
3	Bessel . . . 341	. .	. .	10.5	. .	. .	6 37 10.48	—3.77			Ther. att. 66°.4		
4	Mars . . . N.P.	. .	35.2	48.2	1.0	. .	6 37 48.13	+2.76	37.65	6.53	Bar. red. to 32° F.		
5	Bessel . . . 341	. .	. .	22.7	. .	. .	6 40 22.68	—3.85			27.859		
6	Mars . . . S.F.	. .	. .	1.5	. .	. .	6 41 1.48	+2.07	38.80	5.92			
7	Bessel . . . 341	. .	. .	16.5	. .	. .	6 42 16.48	—3.88½					
8	Mars . . . N.P.	. .	. .	54.0	. .	. .	6 42 53.98	+2.63	37.50	6.51½			
9	Bessel . . . 341	. .	. .	14.0	. .	. .	6 44 13.98	—3.92					
10	Mars . . . S.F.	. .	. .	52.7	. .	. .	6 44 52.68	+1.92½	38.70	5.84½			
11	Bessel . . . 341	. .	. .	49.5	. .	. .	6 45 49.48	—4.01					
12	Mars . . . N.P.	. .	. .	27.0	. .	. .	6 46 26.98	+2.58	37.50	6.59			
13	Bessel . . . 341	. .	. .	29.0	. .	. .	6 51 28.98	—2.77½					
14	Mars . . . S.F.	. .	. .	7.5	. .	. .	6 52 7.48	+3.16½	38.50	5.94			
15	Bessel . . . 341	. .	. .	21.0	. .	. .	6 53 20.98	—2.75					
16	Mars . . . N.P.	. .	. .	59.0	. .	. .	6 53 58.98	+3.76½	38.00	6.51½			
17	Bessel . . . 341	. .	. .	14.0	. .	. .	6 54 13.98	—2.74½					
18	Mars . . . S.F.	. .	. .	52.5	. .	. .	6 55 52.48	+3.12½	38.50	5.87			
19	Bessel . . . 341	. .	. .	6.3	. .	. .	6 57 6.28	—2.74½					
20	Mars . . . N.P.	. .	. .	43.6	. .	. .	6 57 43.58	+3.72	37.30	6.46½			
21	Bessel . . . 341	. .	. .	33.7	. .	. .	6 58 33.68	—2.80			27.960	54.6	
22	Mars . . . S.F.	. .	. .	12.2	. .	. .	6 59 12.18	+3.08½	38.50	5.88½	Ther. att. 66°.3		
23	Bessel . . . 341	. .	. .	10.6	. .	. .	7 0 10.58	—2.82			Bar. red. to 32° F.		
24 b	Mars . . . N.P.	. .	. .	48.5	. .	. .	7 0 48.48	+3.71	+37.90	+6.53	27.858		

Remarks.

Images blurred and unsteady all the time, and the star often extremely indistinct, owing to thin cirri over the sky.

a Recorded 21*s*. at wire C. *b* Interrupted by cirri.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F. . . .	Six transits . . .	6 48 6.23	+ 38.572	+ 5.900	= 1 54.99
Mean N. P. . . .	Six transits . . .	6 49 50.02	+ 37.642	+ 6.524	= 2 7.15

h. m.	m. s.
Correction for chronometer at 6 48 . . .	— 4 55.86
Correction for chronometer at 6 50 . . .	— 4 55.86

	h. m. s.
Santiago sid. time S. F.	6 43 10.37
Santiago sid. time N. P.	6 44 54.16
Interval	1 43.79

	″
Δ P. F. limbs in A. R. reduced to arc . . .	13.95
Variation of A. R. in 1*m*. 44*s*.	— 0.23
Observed P. F. diameter	13.72

	″
Δ N. S. limbs micr. in rev.	0.624 = 12.16
Variation of declination in 1*m*. 44*s*. . .	+ 0.11
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	10.07

h. m.	″
Δ ρ at 6 43	0.12

h. m.	″
Δ ρ at 6 45	0.13

MARCH 1, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1 a	Bessel . . . 341	. .	. .	13.2	. .	. .	6 27 13.18	+2.07½			28.008	67.2	59.9
2	Mars . . . S.F.	. .	. .	40.3	. .	. .	6 27 40.28	3.07	+27.10	+0.99½			
3	Bessel . . . 341	. .	. .	48.5	. .	. .	6 28 48.48	1.97			Ther. att. 72°2. Bar. red. to 32° F. 27.889		
4	Mars . . . N.P.	. .	. .	14.6	. .	. .	6 29 14.58	3.69	26.10	1.72			
5	Bessel . . . 341	. .	. .	28.3	. .	. .	6 30 28.28	1.90					
6	Mars . . . S.F.	. .	. .	55.5	. .	. .	6 30 55.48	3.01	27.20	1.11			
7	Bessel . . . 341	. .	. .	22.6	. .	. .	6 32 22.58	1.87					
8	Mars . . . N.P.	. .	. .	48.8	. .	. .	6 32 48.78	3.62	26.20	1.75			
9	Bessel . . . 341	. .	. .	37.5	. .	. .	6 33 37.48	1.80					
10	Mars . . . N.P.	. .	. .	3.5	. .	. .	6 34 3.48	3.51½	26.00	1.71½			
11	Bessel . . . 341	. .	. .	33.5	. .	. .	6 36 33.48	1.71					
12	Mars . . . S.F.	. .	. .	0.5	. .	. .	6 37 0.48	2.75	27.00	1.04			
13	Bessel . . . 341	. .	. .	56.5	. .	. .	6 38 56.48	1.61½					
14	Mars . . . S.F.	. .	. .	23.5	. .	. .	6 39 23.48	2.69	27.00	1.07½			
15 b	Bessel . . . 341	. .	. .	54.8	. .	. .	6 40 54.78	1.58½					
16	Mars . . . N.P.	. .	. .	21.2	. .	. .	6 41 21.18	3.24½	26.40	1.66			
17	Bessel . . . 341	. .	. .	6.3	. .	. .	6 43 6.28	1.48					
18	Mars . . . S.F.	. .	. .	33.5	. .	. .	6 43 33.48	2.54	27.20	1.06			
19	Bessel . . . 341	. .	. .	25.5	. .	. .	6 44 25.48	1.45½					
20	Mars . . . N.P.	. .	. .	51.5	. .	. .	6 44 51.48	3.15	26.00	1.69½			
21	Bessel . . . 341	. .	. .	32.6	. .	. .	6 46 32.58	1.38½					
22	Mars . . . S.F.	. .	. .	59.8	. .	. .	6 46 59.78	2.43	27.20	1.04½			
23	Bessel . . . 341	. .	. .	58.0	. .	. .	6 47 57.98	1.35					
24	Mars . . . N.P.	. .	. .	24.5	. .	. .	6 48 24.48	3.00	26.50	1.65			
25	Bessel . . . 341	. .	. .	15.6	. .	. .	6 49 15.56	1.30					
26	Mars . . . S.F.	. .	. .	43.0	. .	. .	6 49 42.98	2.35	27.40	1.05			
27	Bessel . . . 341	. .	. .	39.2	. .	. .	6 50 39.18	1.23½					
28	Mars . . . N.P.	. .	. .	5.5	. .	. .	6 51 5.48	2.93	26.30	1.69½			
29	Bessel . . . 341	. .	. .	33.1	. .	. .	6 57 33.08	1.26½					
30	Mars . . . S.F.	. .	. .	0.0	. .	. .	6 57 59.98	2.22	26.90	0.95½			
31	Bessel . . . 341	. .	. .	54.2	. .	. .	6 58 54.18	1.18					
32	Mars . . . N.P.	. .	. .	20.5	. .	. .	6 59 20.48	2.74½	26.30	1.56½			
33	Bessel . . . 341	. .	. .	45.3	. .	. .	7 0 45.28	1.80					
34	Mars . . . S.F.	. .	. .	11.8	. .	. .	7 1 11.78	2.81	26.50	1.01			
35	Bessel . . . 341	. .	. .	19.5	. .	. .	7 2 19.48	1.74					
36	Mars . . . S.F.	. .	. .	45.8	. .	. .	7 2 45.78	+2.75	26.30	1.01			
37	Bessel . . . 341	. .	. .	8.5	. .	. .	7 7 8.48	—4.26					
38	Mars . . . S.F.	. .	. .	35.5	. .	. .	7 7 35.48	3.26	27.00	1.00			
39 c	Bessel . . . 341	. .	. .	11.1	. .	. .	7 9 11.08	4.21½					
40	Mars . . . N.P.	. .	. .	37.2	. .	. .	7 9 37.18	2.61	26.10	1.60½			
41	Bessel . . . 341	. .	. .	22.3	. .	. .	7 10 22.28	4.24					
42	Mars . . . N.P.	. .	. .	48.3	. .	. .	7 10 48.28	2.62	26.00	1.62			
43	Bessel . . . 341	. .	. .	28.6	. .	. .	7 11 28.58	4.29					
44	Mars . . . N.P.	. .	. .	54.6	. .	. .	7 11 54.58	2.65	26.00	1.64			
45	Bessel . . . 341	. .	. .	15.5	. .	. .	7 13 15.48	4.30					
46	Mars . . . S.F.	. .	. .	42.3	. .	. .	7 13 42.28	—3.34	+26.80	+0.96			

MARCH 1, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
47	Bessel . . . 341	. .	. .	48.3	. .	. .	7 14 48.28	—4.36			28.012	65.5	59.6
48	Mars . . . N.P.	. .	. .	14.4	. .	. .	7 15 14.38	2.67	+26.10	+1.69			
49	Bessel . . . 341	. .	. .	0.0	. .	. .	7 15 59.98	4.32			Ther. att. 69°7. Bar. red. to 32° F. 27.900		
50	Mars . . . S.F.	. .	. .	26.8	. .	. .	7 16 26.78	3.34	26.80	0.98			
51	Bessel . . . 341	. .	. .	31.3	. .	. .	7 17 31.28	4.30					
52	Mars . . . N.P.	. .	. .	57.2	. .	. .	7 17 57.18	2.73	25.90	1.57			
53	Bessel . . . 341	. .	. .	49.3	. .	. .	7 18 49.28	4.29					
54	Mars . . . S.F.	. .	. .	16.0	. .	. .	7 19 15.98	3.36½	26.70	0.92½			
55	Bessel . . . 341	. .	. .	6.6	. .	. .	7 20 6.58	4.30					
56	Mars . . . N.P.	. .	. .	32.5	. .	. .	7 30 32.48	2.70	25.90	1.60			
57	Bessel . . . 341	. .	. .	24.6	. .	. .	7 21 24.58	4.32					
58	Mars . . . S.F.	. .	. .	51.5	. .	. .	7 21 51.48	3.38	26.90	0 94			
59	Bessel . . . 341	. .	. .	12.3	. .	. .	7 24 12.28	4.34					
60	Mars . . . N.P.	. .	. .	38.0	. .	. .	7 24 37.98	2.74	25.70	1.60			
61	Bessel . . . 341	. .	. .	29.8	. .	. .	7 25 29.78	4.32					
62	Mars . . . S.F.	. .	. .	56.5	. .	. .	7 25 56.48	3.37	26.70	0.95			
63	Bessel . . . 341	. .	. .	43.2	. .	. .	7 26 43.18	4.33					
64	Mars . . . N.P.	. .	. .	8.9	. .	. .	7 27 8.88	2.75	25.70	1.58			
65	Bessel . . . 341	. .	. .	3.0	. .	. .	7 28 2.98	4.31					
66	Mars . . . S.F.	. .	. .	29.6	. .	. .	7 28 29.58	3.40	26.60	0.91			
67	Bessel . . . 341	. .	. .	8.6	. .	. .	7 29 8.58	4.31					
68	Mars . . . N.P.	. .	. .	34.5	. .	. .	7 29 34.48	2.74	25.90	1.57			
69	Bessel . . . 341	. .	. .	16.5	. .	. .	7 30 16.48	4.28					
70	Mars . . . S.F.	. .	. .	43.6	. .	. .	7 30 43.58	3.38½	27.10	0.89½			
71	Bessel . . . 341	. .	. .	40.8	. .	. .	7 31 40.78	4.28					
72	Mars . . . N.P.	. .	. .	6.8	. .	. .	7 32 6.78	2.78½	26.00	1.49½			
73	Bessel . . . 341	. .	. .	57.8	. .	. .	7 32 57.78	4.33½					
74	Mars . . . S.F.	. .	. .	24.3	. .	. .	7 33 24.28	3.39	26.50	0.94½			
75	Mars . . N.P.	. .	. .	57.0	. .	. .	7 33 56.98	4.33					
76	Bessel . . . 341	. .	. .	24.5	. .	. .	7 34 24.48	—2.75	+27.50	+1.58			

Remarks.

a Quite sharp and good.

b Blurred and indistinct.

c Fine again, and all the remaining observations.

Results.

		h. m. s.
Mean S. F. . . .	Nineteen transits . .	7 2 52.60
Mean N. P. . . .	Nineteen transits . .	7 5 31.93

	h. m.	m. s.
Correction for chronometer at	7 3 . . .	—4 58.76
Correction for chronometer at	7 6 . . .	—4 58.76

	″
Δ P. F. limbs in A. R. reduced to arc . . .	11.28
Variation of A. R. in 2*m*. 39*s*.	— 0.26
Observed P. F. diameter	11.02

h. m.
Δ ρ at 6 58 . . . . 0 02

m. s.	Rev.	′ ″
+26.889	+0.992	=0 19.33
+26.137	+1.632	=0 31.81

	h. m. s.
Santiago sid. time S. F.	6 57 53.84
Santiago sid. time N. P.	7 0 33.17
Interval	2 39.33

	″
Δ N. S. limbs micr. in rev. . . . . 0.640 =	12.47
Variation of declination in 2*m*. 39*s*. . .	+ 0.19
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	10.46

h. m.
Δ ρ at 7 0 . . . . 0.03

MARCH 2, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+1.08			27.890	71.5	62.7
2	Mars . . . S.F.	. .	. .	2.2	. .	. .	6 18 2.18	—3.07	. . .	—4.15			
3	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+0.95			Ther. att. 75°.5		
4	Mars . . . N.P.	. .	. .	37.5	. .	. .	6 19 37.48	—2.54	. . .	3.49	Bar. red. to 32° F.		
5	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+0.89			27.761		
6	Mars . . . S.F.	. .	. .	57.0	. .	. .	6 21 56.98	—3.27	. . .	4.16			
7	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+0.74					
8	Mars . . . N.P.	. .	. .	26.3	. .	. .	6 23 26.28	—2.75	. . .	3.49			
9	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+0.76½					
10	Mars . . . S.F.	. .	. .	54.5	. .	. .	6 24 54.48	—3.45	. . .	4.21½			
11	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+1.05					
12	Mars . . . N.P.	. .	. .	21.3	. .	. .	6 27 21.28	—2.56½	. . .	3.61½			
13	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+0.78					
14	Mars . . . S.F.	. .	. .	37.6	. .	. .	6 30 37.58	—3.48½	. . .	4.26½			
15	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+0.65½					
16	Mars . . . N.P.	. .	. .	19.0	. .	. .	6 32 18.98	—2.91	. . .	3.56½			
17	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+0.54					
18	Mars . . . S.F.	. .	. .	7.5	. .	. .	6 34 7.48	—3.70½	. . .	4.24½			
19	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	+0.42					
20	Mars . . . N.P.	. .	. .	1.3	. .	. .	6 36 1.28	—3.14½	. . .	3.56½			
21	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	2.20½					
22	Mars . . . S.F.	. .	. .	28.2	. .	. .	6 44 28.18	6.64½	. . .	4.44			
23	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	2.50					
24	Mars . . . N.P.	. .	. .	51.6	. .	. .	6 46 51.58	6.11½	. . .	3.61½			
25	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	2.54½					
26	Mars . . . S.F.	. .	. .	19.8	. .	. .	6 48 19.78	6.81½	. . .	4.27			
27	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	2.86					
28	Mars . . . N.P.	. .	. .	57.5	. .	. .	6 49 57.48	6.44½	. . .	3.58½			
29	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	2.92½					
30	Mars . . . S.F.	. .	. .	50.5	. .	. .	6 51 50.48	7.20	. . .	4.27½			
31	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	2.94½					
32	Mars . . . N.P.	. .	. .	11.0	. .	. .	6 53 10.98	6.60	. . .	3.65½			
33	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.02					
34	Mars . . . S.F.	. .	. .	54.6	. .	. .	6 54 54.58	7.29	. . .	4.27			
35	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.09½					
36	Mars . . . N.P.	. .	. .	20.0	. .	. .	6 56 19.98	6.77	. . .	3.67½			
37	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.13					
38	Mars . . . S.F.	. .	. .	51.0	. .	. .	6 57 50.98	7.40	. . .	4.27			
39	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.13					
40	Mars . . . N P.	. .	. .	13.8	. .	. .	6 59 13.78	6.80	. . .	3.67			
41	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.12					
42	Mars . . . S.F.	. .	. .	31.5	. .	. .	7 4 31.48	7.42	. . .	4.30			
43	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.14½					
44	Mars . . . N.P.	. .	. .	55.3	. .	. .	7 5 55.28	6.77½	. . .	3.63			
45	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.13					
46	Mars . . . S.F.	. .	. .	30.3	. .	. .	7 7 30.28	—7.42	. . .	—4.29			

MARCH 2, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	—3.22			27.890	71.5	62.7
48	Mars . . . N.P.	. .	. .	38.1	. .	. .	7 8 38.08	6.87½	. . .	—3.65½			
49	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.21½			Ther. att. 75°.5 Bar. red. to 32° F. 27.761		
50	Mars . . . S.F.	. .	. .	31.0	. .	. .	7 11 30.98	7.59½	. . .	4.38			
51	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.26½					
52	Mars . . . N.P.	. .	. .	59.0	. .	. .	7 12 58.98	6.92	. . .	3.65½			
53	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.24					
54	Mars . . . S.F.	. .	. .	31.4	. .	. .	7 14 31.38	7.60	. . .	4.36			
55	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.28½					
56	Mars . . . N.P.	. .	. .	58.0	. .	. .	7 15 57.98	7.01½	. . .	3.73			
57	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.33					
58	Mars . . . S.F.	. .	. .	14.5	. .	. .	7 17 14.48	7.68½	. . .	4.35½			
59	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.36					
60	Mars . . . N.P.	. .	. .	14.5	. .	. .	7 19 14.48	7.04½	. . .	3.68½			
61	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.41½					
62	Mars . . . S.F.	. .	. .	45.5	. .	. .	7 26 45.48	7.81	. . .	4.39½			
63	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.40					
64	Mars . . . N.P.	. .	. .	12.5	. .	. .	7 28 12.48	7.18	. . .	3.78			
65	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.39					
66	Mars . . . S.F.	. .	. .	21.0	. .	. .	7 29 20.98	7.83½	. . .	4.44½			
67	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.41					
68	Mars . . . N.P.	. .	. .	30.3	. .	. .	7 30 30.28	7.19½	. . .	3.78½			
69	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.40					
70	Mars . . . S.F.	. .	. .	1.5	. .	. .	7 32 1.48	7.81	. . .	4.41			
71	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.42					
72	Mars . . . N.P.	. .	. .	14.5	. .	. .	7 33 14.48	7.14½	. . .	3.72½			
73	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.41					
74	Mars . . . S.F.	. .	. .	19.6	. .	. .	7 35 19.58	7.87½	. . .	4.46½			
75	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.43					
76	Mars . . . N.P.	. .	. .	46.3	. .	. .	7 36 46.28	7.19½	. . .	3.76½			
77	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.41½					
78	Mars . . . S.F.	. .	. .	20.5	. .	. .	7 38 20.48	7.85	. . .	4.43½			
79	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.44½					
80	Mars . . . N.P.	. .	. .	35.5	. .	. .	7 39 35.48	7.21	. . .	3.76½			
81	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.35½					
82	Mars . . . S.F.	. .	. .	8.0	. .	. .	7 45 7.98	7.79	. . .	4.43½			
83	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.34½					
84	Mars . . . N.P.	. .	. .	9.5	. .	. .	7 46 9.48	7.15½	. . .	3.81			
85	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.36					
86	Mars . . . S.F.	. .	. .	12.5	. .	. .	7 47 12.48	7.79	. . .	4.43			
87	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.30½					
88	Mars . . . N.P.	. .	. .	17.0	. .	. .	7 48 16.98	7.12	. . .	3.81½			
89	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.32					
90	Mars . . . S.F.	. .	. .	25.7	. .	. .	7 49 25.68	7.84	. . .	4.52			
91	Bessel . . . 341	. .	. .	. .	. .	. .	. . . . .	3.30½					
92	Mars . . . N.P.	. .	. .	55.0	. .	. .	7 50 54.98	—7.16	. . .	—3.85½			

MARCH 8, 1852—Continued.

Remarks.

Remarks as for last night.

a Tolerably sharp. *b* Blurred.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Twelve transits . . .	7 27 45.11	+2 20.774	+8.617 . . .	=2 47.94
Mean N. P. . .	Twelve transits . . .	7 32 29.29	+2 19.985	+9.218 . . .	=2 59.66

	m. s.		h. m. s.
Correction for chronometer at 7h. 28m. . . .	—5 20.17	Santiago sid. time S. F.	7 22 24.94
Correction for chronometer at 7h. 32m. . . .	—5 20.18	Santiago sid. time N. P.	7 27 9.11
		Interval	4 44.17

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	11.83	Δ N. S. limbs micr. in rev.	0.601=11.71
Variation of A. R. in 4*m*. 44*s*.	+ 0.61	Variation of declination in 4*m*. 44*s*. . .	+ 0.50
Observed P. F. diameter	12.44	orr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	10.02

	′		″
Δ ρ at 7h. 21m.	0.17	Δ ρ at 7h. 26m.	0.18

MARCH 9, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 15412	. .	40.2	53.2	6.0	. .	6 31 53.13	+3.17			27.946	69.6	57.7
2	Mars . . . S.F.	1.2	14.5	27.2	40.2	53.3	6 34 27.28	3.93½	+2 34.15	+0.76½			
3	H. C. . . . 15412	. .	54.7	7.7	20.6	. .	6 36 7.67	2.59			Ther. att. 71°.5 Bar. red. to 32° F. 27.829		
4	Mars . . . N.P.	15.0	28.0	41.0	54.0	6.8	6 38 40.96	3.98	2 33.29	1.39			
5	H. C. . . . 15412	. .	33.5	46.5	59.5	. .	6 40 46.50	1.77					
6	Mars . . . S.F.	54.5	7.5	20.5	33.5	46.5	6 43 20.50	2.47½	2 34.00	0.70½			
7	H. C. . . . 15412	. .	49.7	2.8	15.8	. .	6 45 2.77	1.62					
8	Mars . . . N.P.	10.0	23.1	36.1	49.0	2.0	6 47 36.04	2.94	2 33.27	1.32			
9	H. C. . . . 15412	. .	26.5	39.6	52.6	. .	6 49 39.57	1.41					
10	Mars . . . S.F.	47.9	1.2	14.2	27.0	40.2	6 52 14.10	2.13	2 34.53	0.72			
11	H. C. . . . 15412	. .	9.8	22.8	35.8	. .	6 54 22.80	1.34½					
12	Mars . . . N.P.	30.3	43.1	56.3	9.3	22.3	6 56 56.26	2.57½	2 33.46	1.23			
13	H. C. . . . 15412	. .	40.5	54.0	6.6	. .	6 58 53.70	1.27					
14	Mars . . . S.F.	. .	15.3	28.2	41.2	54.2	7 1 28.27	1.85	2 34.57	0.58			
15	H. C. . . . 15412	. .	4.5	17.5	30.3	. .	7 3 17.43	1.14					
16	Mars . . . N.P.	25.0	38.0	51.0	4.0	17.0	7 5 51.00	2.32	2 33.57	1.18			
17	H. C. . . . 15412	. .	16.5	29.5	42.5	. .	7 7 29.50	1.06					
18	Mars . . . S.F.	37.5	50.7	3.8	16.7	30.0	7 10 3.74	1.64	2 34.24	0.58			
19	H. C. . . . 15412	. .	46.0	58.8	11.9	. .	7 11 58.90	1.02½					
20	Mars . . . N.P.	6.5	19.5	32.6	45.5	58.5	7 14 32.52	2.15	2 33.62	1.12½			
21	H. C. . . . 15412	. .	27.2	40.6	53.5	. .	7 16 40.43	0.97½					
22	Mars . . . S.F.	48.8	2.0	15.0	27.8	41.0	7 19 14.92	1.46½	2 34.49	0.49			
23	H. C. . . . 15412	. .	47.0	0.0	13.0	. .	7 21 0.00	0.95					
24	Mars . . . N.P.	7.7	20.7	33.6	46.7	59.5	7 23 33.64	2.04	2 33.64	1.09			
25	H. C. . . . 15412	. .	24.3	37.2	50.2	. .	7 25 37.23	0.96					
26	Mars . . . S.F.	45.6	58.6	11.6	24.6	37.6	7 28 11.60	+1.43	+2 34.37	+0.47			

MARCH 9, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
27	H. C. . . . 15412	. .	21.0	34.0	46.8	. .	7 31 33.93	+0.99			27.948	67.0	55.0
28	Mars . . . N.P.	41.5	54.5	7.6	20.6	33.5	7 34 7.54	2.05	+2 33.61	+1.06			
29	H. C. . . . 15412	. .	19.5	32.3	45.2	. .	7 35 32.33	1.08½			Ther. att. 69°.3		
30	Mars . . . S.F.	40.7	53.7	6.8	19.7	32.8	7 38 6.74	1.48	2 34.41	0.39½	Bar. red. to 32° F. 27.837		
31	H. C. . . . 15412	. .	9.7	22.7	35.6	. .	8 14 22.67	2.08					
32	Mars . . . N.P.	30.9	43.8	56.9	9.6	22.7	8 16 56.78	2.87½	2 34.11	0.79½			
33	H. C. . . . 15412	. .	30.0	43.0	56.0	. .	8 18 43.00	2.29½					
34	Mars . . . S.F.	52.0	4.8	17.8	30.8	43.9	8 21 17.86	2.48	2 34.86	0.18½			
35	H. C. . . . 15412	. .	13.0	26.0	38.8	. .	8 23 25.93	2.53					
36	Mars . . . N.P.	34.0	47.1	0.3	13.3	26.2	8 26 0.18	3.31	2 34.25	0.78			
37	H. C. . . . 15412	. .	34.6	47.6	0.6	. .	8 27 47.60	2.76					
38	Mars . . . S.F.	56.5	9.6	22.7	35.5	48.5	8 30 22.56	+2.89	+2 34.96	+0.13			

Remarks.

Unsurpassed, in good definition and steady motion, by any night during the series.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Ten transits	7 21 52.76	+2 34.458	+0.502	= 0 9.78
Mean N. P. . .	Nine transits	7 22 41.66	+2 33.647	+1.108	= 0 21.59

	h. m.	m. s.		h. m. s.
Correction for chronometer at	7 22 . .	—5 22.90	Santiago sid. time S. F.	7 16 29.86
Correction for chronometer at	7 23 . .	—5 22.90	Santiago sid. time N. P.	7 17 18.76
			Interval	48.90

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	12.16	Δ N. S. limbs micr. in rev.	0.606 = 11.81
Variation of A. R. in 49s.	+ 0.12	Variation of declination in 49s. . . .	+ 0.09
Observed P. F. diameter	12.28	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	9.70

h. m.	″	h. m.	″
Δ ρ at 7 15	0.01	Δ ρ at 7 16	0.02

MARCH 10, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 15412	. .	43.7	57.0	10.0	. .	6 34 56.90	+3.09			27.980	64.8	59.5
2	Mars . . . S.F.	21.5	34.5	47.8	1.0	14.0	6 37 47.76	—4.82½	+2 50.86	—7.91½	Ther. att. 71°.3		
3	H. C. . . . 15412	. .	25.3	38.3	51.2	. .	6 39 38.27	+2.72½			Bar. red. to 32° F. 27.863		
4	Mars . . . N.P.	. .	15.5	28.5	41.3	54.3	6 42 28.42	—4.37½	2 50.15	7.10			
5	H. C. . . . 15412	26.5	40.0	52.5	6.0	18.8	6 44 52.78	+2.53					
6	Mars . . . S.F.	18.3	31.3	44.3	57.3	10.2	6 47 44.28	—5.64½	2 51.50	8.17½			
7	H. C. . . . 15412	. .	40.2	52.7	5.5	. .	6 53 52.80	+1.70½					
8	Mars . . . N.P.	17.5	30.5	43.5	56.5	9.5	6 56 43.50	—5.58	+2 50.70	—7.28½			

MARCH 10, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
9	H. C. . . . 15412	. .	23.7	36.8	49.9	. .	7 3 36.80	+2.96			27.980	64.8	59.5
10	Mars . . . S.F.	2.5	15.5	28.5	41.3	54.5	7 6 28.46	—5.02	+2 51.66	—7.98			
11	H. C. . . . 15412	. .	13.1	26.2	39.0	. .	7 8 26.10	+2.92½			Ther. att. 71°.3		
12	Mars . . . N.P.	50.5	3.5	16.5	29.5	42.5	7 11 16.50	—4.45	2 50.40	7.37½	Bar. red. to 32° F.		
13	H. C. . . . 15412	. .	8.0	21.0	34.0	. .	7 13 21.00	+2.87			27.863		
14	Mars . . . S.F.	46.3	59.4	12.3	25.4	38.4	7 16 12.36	—5.17	2 51.36	8.04			
15	H. C. . . . 15412	. .	13.6	26.5	39.5	. .	7 18 26.53	+2.84					
16	Mars . . . N.P.	51.5	4.5	17.5	30.5	43.5	7 21 17.50	—4.63½	2 50.97	7.47½			
17	H. C. . . . 15412	. .	46.8	59.6	12.6	. .	7 24 59.67	+2.65					
18 a	Mars . . . S.F.	. .	38.3	57.2	4.2	17.3	7 27 51.27	—5.37	+2 51.60	—8.02			

Remarks.

Same remarks as last night. Bothered by the lamps burning badly all the time.

a Lamps went out.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Four transits . . .	7 2 56.48	+2 50.555 . . .	—7.309	=2 22.45
Mean S. F. . . .	Five transits . . .	7 3 12.83	+2 51.396 . . .	—8.026	=2 36.43

	h. m.	m. s.
Correction for chronometer at	7 3 . . .	—5 26.14
Correction for chronometer at	7 3 . . .	—5 26.14

	h. m. s.
Santiago sid. time N. P.	6 57 30.34
Santiago sid. time S. F.	6 57 46.69
Interval	16.35

	″
Δ P. F. limbs in A. R. reduced to arc . . .	12.61
Variation of A. R. in 16*s*.	— 0.05
Observed P. F. diameter	12.56

	″
Δ N. S. limbs mic. in rev.	0.717 = 13.97
Variation of declination in 16*s*. . . .	— 0.03
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	11.74

h. m.	″	h. m.	″
Δ ρ at 6 56	0.16	Δ ρ at 6 56	0.15

MARCH 11, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	6.8	19.8	32.6	. .	6 51 19.73	— 4.16			28.018	61.5	58.5
2	Bessel . . . 339	. .	. .	12.5	. .	. .	5 52 12.48	—13.40	—52.75	+9.24			
3	Mars . . . N.P.	. .	4.6	17.2	30.2	. .	6 54 17.33	+2.76			Ther. att. 70°.3		
4	Bessel . . . 339	. .	. .	10.2	. .	. .	6 55 10.18	—7.01½	52.85	9.77½	Bar. red. to 32° F. 27.907		
5	Mars . . . S.F.	. .	33.6	46.6	59.7	. .	6 56 46.63	+2.10					
6	Bessel . . . 339	. .	. .	37.8	. .	. .	6 57 37.78	—7.07	51.15	9.17			
7	Mars . . . N.P.	. .	. .	21.5	34.5	. .	6 58 21.53	+2.59					
8	Bessel . . . 339	. .	. .	14.3	. .	. .	6 59 14.28	—7.13	52.75	9.72			
9 a	Mars . . . S.F.	. .	18.0	30.5	43.5	. .	7 2 30.67	+1.91					
10	Bessel . . . 339	. .	. .	22.5	. .	. .	7 3 22.48	—7.13½	—51.81	+9.04½			

MARCH 11, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
11	Mars . . . N.P.	. .	34.0	47.0	59.6	. .	7 11 46.87	+2.35			28.018	61.5	58.5
12	Bessel . . . 339	. .	. .	39.0	. .	. .	7 12 38.98	—7.35	—52.11	+9.70			
13	Mars . . . S.F.	. .	20.0	33.0	46.0	. .	7 15 33.00	+2.05			Ther. att. 70°.3 Bar. red. to 32° F. 27.907		
14	Bessel . . . 339	. .	. .	24.6	. .	. .	7 16 24.58	—6.92½	51.58	8.97½			
15	Mars . . . N.P.	. .	9.7	22.8	35.8	. .	7 19 22.77	+2.64					
16	Bessel . . . 339	. .	. .	15.5	. .	. .	7 20 15.48	—6.95	52.71	9.59			
17 b	Mars . . . S.F.	. .	1.6	14.6	27.5	. .	7 22 14.57	+2.02					
18	Bessel . . . 339	. .	. .	6.3	. .	. .	7 23 6.28	—7.01	51.71	9.03			
19	Mars . . . N.P.	. .	1.4	14.5	27.3	. .	7 25 14.40	+2.61					
20	Bessel . . . 339	. .	. .	6.6	. .	. .	7 26 6.58	—7.00	52.18	9.61			
21	Mars . . . S.F.	. .	16.3	29.2	42.1	. .	7 27 29.20	+2.00½					
22	Bessel . . . 339	. .	. .	21.0	. .	. .	7 28 20.98	—7.00	51.78	9.00½			
23	Mars . . . N.P.	. .	1.6	14.9	27.6	. .	7 30 14.70	+2.61					
24	Bessel . . . 339	. .	. .	7.3	. .	. .	7 31 7.28	—6.96½	52.58	9.57½			
25	Mars . . . S.F.	. .	16.8	30.0	42.8	. .	7 32 29.87	+2.02					
26	Bessel . . . 339	. .	. .	21.5	. .	. .	7 33 21.48	—6.96½	51.61	8.98½			
27	Mars . . . N.P.	. .	38.4	51.4	4.3	. .	7 34 51.37	+2.58					
28	Bessel . . . 339	. .	. .	43.8	. .	. .	7 35 43.78	—6.97½	52.41	9.55½			
29	Mars . . . S.F.	. .	27.5	40.5	53.5	. .	7 38 40.50	+2.00½					
30	Bessel . . . 339	. .	. .	31.5	. .	. .	7 39 31.48	—7.02	50.98	9.02½			
31	Mars . . . N.P.	. .	17.5	30.5	43.5	. .	7 41 30.50	+2.51					
32	Bessel . . . 339	. .	. .	22.5	. .	. .	7 42 22.48	—6·96	51.98	9.47			
33	Mars . . . S.F.	. .	38.6	51.6	4.5	. .	7 43 51.57	+1.93					
34	Bessel . . . 339	. .	. .	43.0	. .	. .	7 44 42.98	—6.92½	51.41	8.85½			
35	Mars . . . N.P.	. .	36.3	49.5	2.5	. .	7 46 49.43	+2.56					
36	Bessel . . . 339	. .	. .	41.3	. .	. .	7 47 41.28	—6.87	51.85	9.43			
37	Mars . . . S.F.	. .	23.6	37.3	50.3	. .	7 49 37.07	+2.00½					
38	Bessel . . . 339	. .	. .	28.7	. .	. .	7 50 28.68	—6.80	51.61	8.80½			
39	Mars . . . N.P.	. .	47.4	0.4	13.4	. .	7 52 0.40	+2.65					
40	Bessel . . . 339	. .	. .	52.5	. .	. .	7 52 52.48	—6.75½	52.08	9.40½			
41	Mars . . . S.F.	. .	18.4	31.2	44.0	. .	7 54 31.20	+2.07					
42	Bessel . . . 339	. .	. .	22.4	. .	. .	7 55 22.38	—6.73	51.18	8.80			
43	Mars . . . N.P.	. .	50.8	3.8	16.6	. .	7 57 3.73	+2.79					
44	Bessel . . . 339	. .	. .	56.0	. .	. .	7 57 55.98	—6.63	52.25	9.42			
45	Mars . . . S.F.	. .	22.3	35.4	48.2	. .	7 59 35.30	+2.18					
46	Bessel . . . 339	. .	. .	26.5	. .	. .	8 0 26.48	—6.56½	51.18	8.74½			
47	Mars . . . N.P.	. .	13.3	26.3	39.2	. .	8 2 26.27	+2.91					
48	Bessel . . . 339	. .	. .	18.5	. .	. .	8 3 18.48	—6.53	52.21	9.44			
49	Mars . . . S.F.	. .	26.5	39.3	52.3	. .	8 4 39.37	+2.21					
50	Bessel . . . 339	. .	. .	30.5	. .	. .	8 5 30.48	—6.49	51.11	8.70			
51	Mars . . . N.P.	. .	36.0	48.5	1.7	. .	8 6 48.73	+2.89			28.022	61.0	56.6
52	Bessel . . . 339	. .	. .	40.5	. .	. .	8 7 40.48	—6.44½	51.75	9.33½			
53	Mars . . . S.F.	. .	57.2	10.0	22.8	. .	8 10 10.00	+2.39			Ther. att. 68°.0 Bar. red. to 32° F. 27.915		
54	Bessel . . . 339	. .	. .	1.3	. .	. .	8 11 1.28	—6.26½	51.28	8.65½			
55	Mars . . . N.P.	. .	10.5	23.5	36.5	. .	8 12 23.50	+3.06½					
56	Bessel . . . 339	. .	. .	15.0	. .	. .	8 13 14.98	—6.23	—51.48	+9.29½			

MARCH 11, 1852—Continued.

Remarks.

Same remarks as last night.

a Somewhat blurred. *b* Very sharp and steady.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F. . .	Fourteen transits . . .	7 33 32.05	—51.520	+8.931	=2 54.06
Mean N. P. . .	Fourteen transits . . .	7 36 39.37	—52.228	+9.523	=3 5.60

	h. m. m. s.		h. m. s.
Correction for chronometer at 7 34 . . .	—5 29.36	Santiago sid. time S. F.	7 28 2.69
Correction for chronometer at 7 37 . . .	—5 29.36	Santiago sid. time N. P.	7 31 10.01
		Interval	3 7.32
	″		″
Δ P. F. limbs in A. R. reduced to arc . .	10.62	Δ N. S. limbs micr. in rev.	0.592 = 11.54
Variation of A. R. in 3*m*. 7*s*.	+ 0.69	Variation of declination in 3*m*. 7*s*. . .	+ 0.38
Observed P. F. diameter	11.31	Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	9.72
h. m.	″	h. m.	″
Δ ρ at 7 28	0.17	Δ ρ at 7 32	0.18

MARCH 12, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	. .	33.6	46.5	. .	6 40 33.58	—4.19			27.981		59.6
2	Bessel . . . 339	. .	. .	3.3	. .	. .	6 41 3.28	4.17½	—29.70	—0.01½			
3	Mars . . . N.P.	. .	47.0	0.5	13.4	. .	6 43 0.30	3.62½			Ther. att. 70°.7 Bar. red. to 32° F. 27.866		
4	Bessel . . . 339	. .	. .	31.0	. .	. .	6 43 30.98	4.18½	30.68	+0.56			
5	Mars . . . S.F.	. .	12.5	25.4	38.4	. .	6 45 25.43	4.32½					
6	Bessel . . . 339	. .	. .	55.0	. .	. .	6 45 54.98	4.29	29.55	—0.03½			
7	Mars . . . N.P.	. .	59.0	12.0	24.6	. .	6 47 11.87	3.79					
8	Bessel . . . 339	. .	. .	42.0	. .	. .	6 47 41.98	4.25½	30.11	+0.46½			
9	Mars . . . N.P.	. .	5.2	18.2	31.1	. .	6 49 18.17	3.85½					
10	Bessel . . . 339	. .	. .	48.2	. .	. .	6 49 48.18	4.36½	30.01	+0.51			
11	Mars . . . S F.	. .	50.2	3.8	16.8	. .	6 52 3.60	4.53½					
12	Bessel . . . 339	. .	. .	33.5	. .	. .	6 52 33.48	4.43	29.88	—0.10½			
13 *a*	Mars . . . S.F.	. .	10.3	23.3	36.3	. .	6 54 33.30	4.65½					
14	Bessel . . . 339	. .	. .	2.5	. .	. .	6 55 2.48	4.52½	29.18	—0.13			
15	Mars . . . N.P.	. .	1.5	14.4	27.2	. .	6 56 14.37	4.06					
16	Bessel . . . 339	. .	. .	44.5	. .	. .	6 56 44.48	4.62	30.11	+0.56			
17	Mars . . . S.F.	. .	30.5	43.5	56.5	. .	6 58 43.50	4.76					
18	Bessel . . . 339	. .	. .	12.5	. .	. .	6 59 12.48	4.58	28.98	—0.18			
19	Mars . . . N.P.	. .	22.2	35.0	48.0	. .	7 0 35.07	4.21					
20	Bessel . . . 339	. .	. .	5.2	. .	. .	7 1 5.18	4.64½	30.11	+0.43½			
21 *b*	Mars . . . S.F.	. .	13.3	26.5	39.4	. .	7 7 26.40	5.06					
22	Bessel . . . 339	. .	. .	. .	. .	. .	. . . .	4.81	. . .	—0.25			
23	Mars . . . N.P.	. .	13.6	26.7	39.6	. .	7 9 26.63	4.41					
24	Bessel . . . 339	. .	. .	56.5	. .	. .	7 9 56.48	4.80	29.85	+0.39			
25 *b*	Mars . . . S.F.	. .	28.5	42.0	54.5	. .	7 12 41.67	5.08					
26	Bessel . . . 339	. .	. .	. .	. .	. .	. . . .	4.83½	. . .	—0.24½			
27	Mars . . . N.P.	. .	2.5	15.5	28.3	. .	7 16 15.43	4.52					
28	Bessel . . . 339	. .	. .	45.1	. .	. .	7 16 45.08	—4.87½	—29.65	+0.35½			

MARCH 12, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
29	Mars . . . S.F.	. .	36.5	49.5	2.5	. .	7 18 49.50	—5.11			27.981		59.6
30	Bessel . . . 339	. .	. .	18.5	. .	. .	7 19 18.48	4.81½	—28.98	—0.29½			
31	Mars . . . N.P.	. .	24.2	37.3	50.2	. .	7 22 37.23	4.54½			Ther. att. 70°.7 Bar. red. to 32° F. 27.866		
32	Bessel . . . 339	. .	. .	6.8	. .	. .	7 23 6.78	4.85½	29.55	+0.31			
33	Mars . . . S.F.	. .	50.5	3.5	16.5	. .	7 25 3.50	5.17					
34	Bessel . . . 339	. .	. .	32.5	. .	. .	7 25 32.48	4.85½	28.98	—0.31½			
35	Mars . . . N.P.	. .	15.0	28.3	41.0	. .	7 29 28.10	4.56					
36	Bessel . . . 339	. .	. .	57.5	. .	. .	7 29 57.48	4.90	29.38	+0.34			
37	Mars . . . S.F.	. .	15.3	28.0	41.0	. .	7 31 28.10	5.17½					
38	Bessel . . . 339	. .	. .	56.6	. .	. .	7 31 56.58	4.79½	28.48	—0.38			
39	Mars . . . S.F.	. .	59.7	12.7	25.5	. .	7 34 12.63	5.13½					
40	Bessel . . . 339	. .	. .	41.5	. .	. .	7 34 41.48	4.77	28.85	—0.36½			
41	Mars . . . N.P.	. .	10.5	23.5	36.5	. .	7 36 23.50	4.55½					
42	Bessel . . . 339	. .	. .	53.0	. .	. .	7 36 52.98	4.80½	29.48	+0.25			
43	Mars . . . S.F.	. .	30.8	43.9	56.7	. .	7 38 43.80	5.18					
44	Bessel . . . 339	. .	. .	12.6	. .	. .	7 39 12.58	4.78½	28.78	—0.39½			
45	Mars . . . N.P.	. .	9.7	22.6	35.7	. .	7 40 22.67	4.57					
46	Bessel . . . 339	. .	. .	52.0	. .	.	7 40 51.98	4.76	29.31	+0.19			
47	Mars . . . S.F.	. .	4.0	17.0	30.0	. .	7 42 17.00	5.14½					
48	Bessel . . . 339	. .	. .	45.7	. .	. .	7 42 45.68	4.73	28.68	—0.41½			
49	Mars . . . N.P.	. .	55.5	8.5	21.3	. .	7 44 8.43	4.55					
50	Bessel . . . 339	. .	. .	37.6	. .	. .	7 44 37.58	4.68	29.15	+0.13			
51	Mars . . . S.F.	. .	37.3	50.3	3.2	. .	7 45 50.27	5.12					
52	Bessel . . . 339	. .	. .	19.0	. .	. .	7 46 18.98	4.66	28.71	—0.46			
53	Mars . . . N.P.	. .	21.0	34.5	47.4	. .	7 48 34.30	4.46					
54	Bessel . . . 339	. .	. .	3.8	. .	. .	7 49 3.78	4.59	29.48	+0.13			
55	Mars . . . S.F.	. .	18.8	21.6	34.6	. .	7 50 21.67	5.07					
56	Bessel . . . 339	. .	. .	50.3	. .	. .	7 50 50.28	4.58½	28.61	—0.48½			
57	Mars . . . N.P.	. .	7.3	20.3	33.3	. .	7 52 20.30	4.42					
58	Bessel . . . 339	. .	. .	49.5	. .	. .	7 52 49.48	4.47	29.18	+0.05			
59	Mars . . . N.P.	. .	52.8	5.7	18.7	. .	7 54 5.73	4.41					
60	Bessel . . . 339	. .	. .	35.0	. .	. .	7 54 34.98	4.47½	29.25	+0.06½			
61	Mars . . . S.F.	. .	13.7	26.7	39.6	. .	7 56 26.67	4.96½					
62	Bessel . . . 339	. .	. .	55.0	. .	. .	7 56 54.98	4.40½	28.31	—0.56			
63	Mars . . . N.P.	. .	29.8	43.0	55.8	. .	7 58 42.87	4.30					
64	Bessel . . . 339	. .	. .	12.0	. .	. .	7 59 11.98	4.37	29.11	+0.07			
65	Mars . . . S.F.	. .	3.2	16.0	29.0	. .	8 0 16.07	4.88					
66	Bessel . . . 339	. .	. .	44.5	. .	. .	8 0 44.48	4.32	28.41	—0.56			
67	Mars . . . N.P.	. .	43.8	56.7	9.8	. .	8 1 56.77	4.23					
68	Bessel . . . 339	. .	. .	26.0	. .	. .	8 2 25.98	4.25	29.21	+0.02			
69	Mars . . . S.F.	. .	11.5	24.4	37.3	. .	8 3 24.40	4.80½					
70	Bessel . . . 339	. .	. .	52.7	. .	. .	8 3 52.68	4.19½	28.28	—0.61			
71	Mars . . . N.P.	. .	55.5	8.5	21.4	. .	8 6 8.47	4.13½					
72	Bessel . . . 339	. .	. .	37.5	. .	. .	8 6 37.48	4.10	29.01	0.03½			
73	Mars . . . S.F.	. .	23.7	36.8	49.8	. .	8 7 36.77	4.68					
74	Bessel . . . 339	. .	. .	5.2	. .	. .	8 8 5.18	—4.09	—28.41	—0.59			

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
	MARCH 12, 1852—Continued.												
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
75	Mars . . . N.P.	. .	5.0	18.0	31.0	. .	8 9 18.00	—4.03			27.987		57.9
76	Bessel . . . 339	. .	. .	47.0	. .	. .	8 9 46.98	4.02½	—28.98	—0.00½			
77	Mars . . . S.F.	. .	55.0	7.8	21.0	. .	8 11 7.93	4.59			Ther. att. 69°.4		
78	Bessel . . . 339	. .	. .	36.5	. .	. .	8 11 36.48	3.95	28.55	0.64	Bar. red. to 32° F.		
79	Mars . . . N.P.	. .	44.6	58.2	11.2	. .	8 12 58.00	3.92			29.876		
80	Bessel . . . 339	. .	. .	27.3	. .	. .	8 13 27.28	—3.86	—29.28	—0.06			

Remarks.

Good images and satisfactory measures throughout.

a Recorded 41.3*s*. at wire D. *b* Not incorporated into the means.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F.	Five transits	6 50 15.88	—29.458	—0.093	=0 1.81
Mean N. P.	Five transits	6 51 15.95	30.204	+0.506	0 9.86
Mean N. P.	Fifteen transits	7 45 31.10	29.325	+0.147	0 2.86
Mean S. F.	Thirteen transits	7 46 35.25	—28.618	—0.467	=0 9.10

h. m.	m. s.
Correction for chronometer at 6 50	—5 32.26
Correction for chronometer at 6 51	—5 32.26

	h. m. s.
Santiago sid. time S. F.	6 44 43.62
Santiago sid. time N. P.	6 45 43.69
Interval	1 0.07

h. m.	m. s.
Correction for chronometer at 7 46	—5 32.37
Correction for chronometer at 7 47	—5 32.37

	h. m. s.
Santiago sid. time N. P.	7 39 58.73
Santiago sid. time S. F.	7 41 2.88
Interval	1 4.15

	″
Δ P. F. limbs in A. R. reduced to arc	11.19
Variation of A. R. in 1*m*.	+ 0.25
Observed P. F. diameter	11.44

	″
Δ N. S. limbs micr. in rev.	0.599 = 11.67
Variation of declination in 1*m*.	+ 0.13
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	9.60

	″
Δ P. F. limbs in A. R. reduced to arc	10.60
Variation of A. R. in 1*m*. 4*s*.	— 0.27
Observed P. F. diameter	10.33

	″
Δ N. S. limbs micr. in rev.	0.614 = 11.96
Variation of declination in 1*m*. 4*s*.	— 0.13
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	9.63

h. m.	″
Δ ρ at 6 45	0.00
Δ ρ at 6 47	0.01

h. m.	″
Δ ρ at 7 40	0.00
Δ ρ at 7 41	0.01

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
	MARCH 13, 1852.												
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	. .	51.5	. .	. .	6 48 51.48	—4.87			27.973	68.3	59.0
2	Bessel . . . 339	. .	. .	. .	. .	. .	. . . .	+4.82	. . .	—9.69			
3	Mars . . . N.P.	. .	44 0	. .	. .	. .	6 50 56.93	—4.32			Ther. att. 72°.4		
4	Bessel . . . 339	. .	. .	. .	. .	. .	. . . .	+4.74½	. . .	9.06½	Bar. red. to 32° F.		
5	Mars . . . S.F.	. .	23.8	. .	. .	. .	6 53 36.73	—5.00			27.853		
6	Bessel . . . 339	. .	. .	. .	. .	. .	. . . .	+4.67	. . .	—9.67			

MARCH 13, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
7	Mars . . . N.P.	. .	8.5	. .	. .	. .	6 55 21.43	—4.44			27.973	68.3	59.0
8	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.68	. . .	—9.12			
9	Mars . . . S.F.	. .	46.0	. .	. .	. .	6 57 58.93	—5.13			Ther. att. 72°.4		
10	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.53½	. . .	9.66½	Bar. red. to 32° F.		
11	Mars . . . N.P.	. .	46.5	. .	. .	. .	6 59 59.43	—4.63			27.853		
12	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.48½	. . .	9.11½			
13	Mars . . . S.F.	. .	46.0	. .	. .	. .	7 4 58.93	—5.36					
14	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.38	. . .	9.74			
15	Mars . . . N.P.	. .	29.8	. .	. .	. .	7 7 42.73	—4.84					
16	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.39½	. . .	9.23½			
17	Mars . . . S.F.	. .	10.6	. .	. .	. .	7 9 23.52	—5.52					
18	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.37½	. . .	9.89½			
19	Mars . . . N.P.	. .	48.5	. .	. .	. .	7 10 1.43	—5.12					
20	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.30	. . .	9.42			
21	Mars . . . S.F.	. .	32.5	. .	. .	. .	7 15 45.43	—5.59					
22	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.28½	. . .	9.87½			
23	Mars . . . N.P.	. .	19.2	. .	. .	. .	7 20 32.13	—5.02					
24	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.26	. . .	9.28			
25	Mars . . . S.F.	. .	56.3	. .	. .	. .	7 22 9.23	—5.63½					
26	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.24	. . .	9.87½			
27	Mars . . . N.P.	. .	44.5	. .	. .	. .	7 25 57.43	—5.02					
28	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.31	. . .	9.33			
29	Mars . . . S.F.	. .	32.5	. .	. .	. .	7 29 45.43	—5.69½					
30	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.22	. . .	9.91½			
31	Mars . . . S.F.	. .	9.3	. .	. .	. .	7 31 22.23	—5.78					
32	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.19	. . .	9.97			
33	Mars . . . N.P.	. .	54.6	. .	. .	. .	7 35 7.53	—5.17					
34	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.21	. . .	9.38			
35	Mars . . . N.P.	. .	32.5	. .	. .	. .	7 36 45.43	—5.16					
36	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.24	. . .	9.40			
37	Mars . . . S.F.	. .	16.8	. .	. .	. .	7 38 29.73	—5.76					
38	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.26½	. . .	10.02½			
39	Mars . . . N P.	. .	56.7	. .	. .	. .	7 41 9.63	—5.19					
40	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.25	. . .	9.44			
41	Mars . . . S.F.	. .	13.8	. .	. .	. .	7 43 26.73	—5.79½					
42	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.26½	. . .	10.06			
43	Mars . . . N.P.	. .	47.9	. .	. .	. .	7 45 0.83	—5.19					
44	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.26	. . .	9.45			
45	Mars . . . S.F.	. .	30.3	. .	. .	. .	7 46 43.23	—5.75½					
46	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.33½	. . .	10.09			
47	Mars . . . N P.	. .	16.3	. .	. .	. .	7 48 29.23	—5.15½					
48	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.35½	. . .	9.51			
49	Mars . . . S.F.	. .	4.8	. .	. .	. .	7 50 17.73	—5.72					
50	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.40	. . .	10.12			
51	Mars . . . N.P.	. .	35.2	. .	. .	. .	7 51 48.13	—5.12					
52	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.31½	. . .	—9.43½			

MARCH 13, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
53	Mars . . . S.F.	. .	50.5	. .	. .	. .	7 54 3.43	—5.75			27.976	67.3	57.7
54	Bessel . . 339	. .	. .	. .	. .	. .	. . . . .	+4.36	. . .	—10.11			
55	Mars . . . N.P.	. .	24.3	. .	. .	. .	7 55 37.23	—5 61			Ther. att. 71°.1		
56	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+3.95	. . .	9.56	Bar. red. to 32° F.		
57	Mars . . . S.F.	. .	50.3	. .	. .	. .	7 58 3.23	—6.21			27.860		
58	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+3.95	. . .	10.16			
59	Mars . . . N.P.	. .	28.0	. .	. .	. .	7 59 40.93	—5.59					
60	Bessel . . . 339	. .	. .	. .	. .	. .	. . . . .	+4.05	. . .	—9.64			

Remarks.

Never better or more steady images; but the interval of A. R. is so small that neither object can be measured near the centre of the field.

Results.

		h. m. s.	Rev.	′ ″
Mean S. F. . .	Fifteen transits . . .	7 24 53.07	—9.924	=3 13.42
Mean N. P. . .	Fifteen transits . . .	7 28 20.70	—9.359	=3 2.41

	m. s.		h. m. s.
Correction for chronometer at 7h 25m . . .	—5 35.81	Santiago sid. time S. F.	7 19 17.26
Correction for chronometer at 7 28 . . .	—5 35.82	Santiago sid. time N. P.	7 22 44.88
		Interval	3 27.62

h. m.	″		″
Δ ρ at 7 19	0.18	Δ N. S. limbs micr. in rev.	0.565 = 11.01
Δ ρ at 7 23	0.19	Variation of declination in 3m. 28s. . .	+ 0.46
		Corr. for diam. of micr. wires	— 2.20
		Observed N. S. diameter	9.27

MARCH 14, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Mars . . . S F.	. .	0.5	13.5	26.5	. .	6 51 13.50	+2.87			27.988	69.8	58.4
2	H. C. . . . 15608	. .	16.3	28.8	41.8	. .	6 52 28.97	—6.65½	—1 15.47	+9.52½			
3	Mars . . . N.P.	. .	1.2	14.5	27.5	. .	6 54 14.40	+3.32			Ther. att. 73°.0		
4	H. C. . . . 15608	. .	18.5	31.5	44.5	. .	6 55 31.50	—6.87	1 17.10	10.19	Bar. red. to 32° F. 27.866		
5	Mars . . . S.F.	. .	48.3	1.3	14.2	. .	6 57 1.27	+2.54					
6	H. C. . . . 15608	. .	3.8	16.8	29.6	. .	6 58 16.77	—6.97	1 15.50	9.51			
7	Mars . . . N.P.	. .	24.0	37.0	50.0	. .	6 59 37.00	+3.06½					
8	H. C. . . . 15608	. .	40.1	53.0	5.9	. .	7 0 53.00	—6.99	1 16.00	10.05½			
9	Mars . . . S.F.	. .	30.6	43.5	56.5	. .	7 2 43.53	+2.41					
10	H. C. . . . 15608	. .	46.0	58.8	11.6	. .	7 3 58.80	—7.07	1 15.27	9.48			
11	Mars . . . N.P.	. .	35.0	48.0	1.0	. .	7 5 48.00	+2.91½					
12	H. C. . . . 15608	. .	51.2	4.0	16.8	. .	7 7 4.00	—7.12	1 16.00	10.03½			
13	Mars . . . S.F.	. .	21.2	34.3	47.3	. .	7 8 34.27	+2.29					
14	H. C. . . . 15608	. .	36.5	49.5	2.5	. .	7 9 49.50	—1.18	—1 15.23	+9.47			

MARCH 14, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
15	Mars . . . N.P.	. .	2.0	15.3	28.1	. .	7 11 15.13	+2.78			27.988	69.8	58.4
16	H. C. . . . 15608	. .	18.3	31.1	44.0	. .	7 12 31.13	—7.28	—1 16.00	+10.06			
17	Mars . . . S.F.	. .	49.5	2.7	15.6	. .	7 14 2.60	+2.08			Ther. att. 73°.0		
18	H. C. . . . 15608	. .	4.5	17.6	30.5	. .	7 15 17.53	—7.28½	1 14.93	9.36½	Bar. red. to 32° F.		
19	Mars . . . N.P.	. .	45.6	58.5	11.5	. .	7 16 58.53	+2.61			27.8[illegible]6		
20	H. C. . . . 15608	. .	1.2	14.0	26.8	. .	7 18 14.00	—7.32	1 15.47	9.93			
21	Mars . . . S.F.	. .	5.3	17.5	30.8	. .	7 21 17.87	+2.02½					
22	H. C. . . . 15608	. .	19.8	32.6	45.5	. .	7 22 32.63	—7.30	1 14.76	9.32½			
23	Mars . . . N.P.	. .	41.5	54.3	6.6	. .	7 23 54.13	+2.57½					
24	H. C. . . . 15608	. .	56.8	9.8	22.6	. .	7 25 9.73	—7.30	1 15.60	9.87½			
25	Mars . . . S.F.	. .	23.1	36.1	48.9	. .	7 26 36.03	+1.97½					
26	H. C. . . . 15608	. .	38.2	51.0	3.8	. .	7 27 51.00	—7.34½	1 14.97	9.32			
27	Mars . . . N.P.	. .	5.0	18.1	31.1	. .	7 29 18.07	+2.57					
28	H. C. . . . 15608	. .	20.5	33.5	46.5	. .	7 30 33.50	—7.29½	1 15.43	9.86½			
29	Mars . . . S.F.	. .	48.5	1.5	14.5	. .	7 32 1.50	+1.92					
30	H. C. . . . 15608	. .	3.5	16.5	29.5	. .	7 33 16.50	—7.35	1 15.00	9.27			
31	Mars . . . N.P.	. .	29.0	42.3	55.3	. .	7 34 42.20	+2.50½					
32	H. C. . . . 15608	. .	44.5	57.5	10.5	. .	7 35 57.50	—7.28½	1 15.30	9.79			
33	Mars . . . S.F.	. .	3.0	16.2	28.8	. .	7 37 16.00	+1.89					
34	H. C. . . . 15608	. .	17.8	30.5	43.5	. .	7 38 30.60	—7.31	1 14.60	9.20			
35	Mars . . . N.P.	. .	24.1	37.1	50.2	. .	7 40 37.13	+2.47					
36	H. C. . . . 15608	. .	39.6	52.6	5.5	. .	7 41 52.57	—7.32	1 15.44	9.79			
37	Mars . . . S.F.	. .	53.4	6.5	19.5	. .	8 13 6.47	+2.36					
38	H. C. . . . 15608	. .	7.5	20.5	33.5	. .	8 14 20.50	—6.59	1 14.03	8.95			
39	Mars . . . N.P.	. .	4.5	17.5	30.3	. .	8 16 17.43	+3.08					
40	H. C. . . . 15608	. .	19.0	32.0	45.8	. .	8 17 32.27	—6.40½	1 14.84	9.48½			
41	Mars . . . S.F.	. .	5.3	18.2	31.2	. .	8 22 18.23	+2.02					
42	H. C. . . . 15608	. .	18.5	31.6	44.6	. .	8 23 31.57	—6.87	1 13.34	8.89			
43	Mars . . . N.P.	. .	46.2	59.2	12.0	. .	8 24 59.13	+2.78					
44	H. C. . . . 15608	. .	0.5	13.5	26.5	. .	8 26 13.50	—6.76	1 14.37	9.54			
45	Mars . . . S.F.	. .	26.2	39.5	52.3	. .	8 27 39.33	+2.17					
46	H. C. . . . 15608	. .	40.0	53.0	5.7	. .	8 28 52.90	—6.69	1 13.57	8.86			
47	Mars . . . N.P.	. .	52.3	5.3	18.3	. .	8 30 5.30	+2.84½			27.992	64.7	56.4
48	H. C. . . . 15608	. .	6.8	19.6	32.6	. .	8 31 19.67	—6.56½	1 14.37	9.41			
49	Mars . . . S.F.	. .	13.5	27.0	40.0	. .	8 32 26.83	+2.30			Ther. att. 70.7		
50 a	H. C. . . . 15608	. .	27.6	40.3	53.4	. .	8 33 40.10	—6.49	1 13.27	8.79	Bar. red. to 32° F.		
51	Mars . . . N.P.	. .	34.5	47.5	0.5	. .	8 34 47.50	+3.02			27.877		
52	H. C. . . . 15608	. .	48.6	1.6	14.5	. .	8 36 1.57	—6.43½	—1 14.07	+9.45½			

Remarks.

Quite steady, but dim all the evening.

a Recorded 22.6*s*. at wire B.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Thirteen transits . . .	7 35 52.11	— 1 14.611	+ 9.227	= 2 59.83
Mean N. P. . .	Thirteen transits . . .	7 38 39.53	— 1 15.384	+ 9.806	= 3 11.12

MARCH 14, 1852—Continued.

Results—Continued.

	h. m.	m s.		h. m. s.
Correction for chronometer at	7 36	—5 38.78	Santiago sid. time for S. F.	7 30 13.33
Correction for chronometer at	7 39	—5 38.78	Santiago sid. time for N. P.	7 33 0.75
			Interval	2 47.42
		"		"
Δ P. F. limbs in A. R. reduced to arc		11.59	Δ N. S. limbs micr. in rev.	0.579 = 11.28
Variation of A. R. in 2*m*. 47*s*.		+ 0.85	Variation of declination in 2*m*. 47*s*.	+ 0.38
Observed P. F. diameter		12.44	Corr. for diam. of micr. wires	— 2.20
			Observed N. S. diameter	9.46
	h. m.	"	h. m.	"
Δ ρ at	7 31	0.18	Δ ρ at 7 34	0.19

MARCH 15, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Mars . . . S.F.	. .	28.5	42.0	55.0	. .	6 49 41.83	+1.05			28.015	64.5	59.1
2	H. C. . . . 15608	. .	13.6	26.5	39.5	. .	6 50 26.53	1.82	—44.70	—0.77			
3	Mars . . . N.P.	. .	36.5	49.5	2.5	. .	6 51 49.50	1.58			Ther. att. 71°.7		
4	H. C. . . . 15608	. .	21.8	34.8	47.6	. .	6 52 34.73	1.77	45.23	0.19	Bar. red. to 32° F.		
5	Mars . . . S.F.	. .	37.5	50.4	3.3	. .	6 53 50.40	0.93			27.897		
6	H. C. . . . 15608	. .	22.0	35.0	48.0	. .	6 54 35.00	1.73	44.60	0.80			
7	Mars . . . S.F.	. .	37.4	50.4	3.2	. .	6 55 50.33	0.85					
8	H. C. . . . 15608	. .	22.0	34.6	47.8	. .	6 56 34.80	1.70	44.47	0.85			
9	Mars . . . N.P.	. .	56.0	9.0	21.8	. .	6 58 8.93	1.33					
10	H. C. . . . 15608	. .	41.0	54.0	7.0	. .	6 58 54.00	1.65	45.07	0.32			
11	Mars . . . N.P.	. .	59.5	12.5	25.4	. .	7 0 12.47	1.43					
12	H. C. . . . 15608	. .	44.5	57.5	10.5	. .	7 0 57.50	1.69	45.03	0.26			
13	Mars . . . S.F.	. .	43.5	57.0	9.8	. .	7 4 56.77	0.70					
14	H. C. . . . 15608	. .	28.0	41.0	54.0	. .	7 5 41.00	1.61½	44.23	0.91½			
15	Mars . . . N.P.	. .	40.5	53.5	6.4	. .	7 6 53.47	1.33½					
16	H. C. . . . 15608	. .	25.5	38.5	51.3	. .	7 7 38.43	1.63½	44.96	0.30			
17	Mars . . . S.F.	. .	41.2	54.3	7.0	. .	7 8 54.17	0.72					
18 *a*	H. C. . . . 15608	. .	25.6	38.5	51.3	. .	7 9 38.47	1.59	44.30	0.87			
19	Mars . . . N.P.	. .	49.3	2.1	15.0	. .	7 11 2.13	1.30					
20	H. C. . . . 15608	. .	34.2	47.0	0.0	. .	7 11 47.07	1.63½	44.94	0.33½			
21	Mars . . . S.F.	. .	5.3	18.8	31.6	. .	7 14 18.57	0.65½					
22	H. C. . . . 15608	. .	50.0	3.0	16.0	. .	7 15 3.00	1.65	44.43	0.99½			
23	Mars . . . N.P.	. .	21.6	34.5	47.4	. .	7 16 34.50	1.27					
24	H. C. . . . 15608	. .	6.3	19.2	32.1	. .	7 17 19.20	1.61	44.70	0.34			
25	Mars . . . S.F.	. .	31.3	44.6	57.7	. .	7 20 44.53	0.65					
26	H. C. . . . 15608	. .	16.0	28.8	41.8	. .	7 21 28.87	1.63	44.34	0.98			
27	Mars . . . N.P.	. .	29.8	43.3	55.5	. .	7 22 42.87	1.24½					
28	H. C. . . . 15608	. .	14.5	27.5	40.4	. .	7 23 27.47	1.68	44.60	0.43½			
29	Mars . . . S.F.	. .	33.0	46.2	59.1	. .	7 24 46.10	0.67½					
30 *b*	H. C. . . . 15608	. .	17.2	30.0	42.8	. .	7 25 30.00	1.69	43.90	1.01½			
31	Mars . . . N.P.	. .	10.5	24.0	36.5	. .	7 28 23.67	1.30					
32	H. C. . . . 15608	. .	55.5	8.5	21.5	. .	7 29 8.50	1.74½	44.83	0.44½			
33	Mars . . . S.F.	. .	19.0	32.0	45.0	. .	7 30 32.00	0.72					
34	H. C. . . . 15608	. .	2.6	15.6	28.5	. .	7 31 15.57	+1.76	—43.57	—1.04			

MARCH 15, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
35	Mars . . . N.P.	. .	24.2	37.3	50.2	. .	7 32 37.23	+1.31½			28.015	64.5	59.1
36	H. C. . . . 15608	. .	8.5	21.5	24.6	. .	7 33 21.53	1.79	—44.30	—0.47½			
37	Mars . . . S.F.	. .	39.5	52.5	5.5	. .	7 34 52.50	0.76			Ther. att. 71°.7 Bar. red. to 32° F. 27.897		
38	H. C. . . . 15608	. .	23.2	36.3	49.1	. .	7 35 36.20	1.86	43.70	1.10			
39	Mars . . . N P.	. .	28.0	41.0	53.6	. .	7 36 40.87	1.37					
40	H. C. . . . 15608	. .	12.0	25.2	38.3	. .	7 37 25.17	1.88	44.30	0.51			
41	Mars . . . S.F.	. .	47.4	0.3	13.3	. .	7 40 0.33	0.79½					
42	H. C. . . . 15608	. .	31.0	44.0	56.8	. .	7 40 43.93	1.95	43.60	1.15½			
43	Mars . . . N.P.	. .	39.5	52.8	5.6	. .	7 41 52.63	1.44					
44	H. C. . . . 15608	. .	24.1	37.0	50.0	. .	7 42 37.03	1.96½	44.40	0.52½			
45	Mars . . . S.F.	. .	47.2	0.0	13.0	. .	7 44 0.07	0.84					
46	H. C. . . . 15608	. .	30.5	43.4	56.3	. .	7 44 43.40	2.00	43.33	1.16			
47	Mars . . . N.P.	. .	57.0	10.0	23.0	. .	7 46 10.00	1.51					
48	H. C. . . . 15608	. .	41.5	54.4	7.0	. .	7 46 54.30	2.10½	44.30	0.59½			
49	Mars . . . S F.	. .	0.3	13.1	26.0	. .	7 48 13.13	0.93					
50	H. C. . . . 15608	. .	43.6	56.5	9.5	. .	7 48 56.53	2.13	43.40	1.20			
51	Mars . . . N.P.	. .	47.5	0.4	13.4	. .	7 50 0.43	1.61					
52	H. C. . . . 15608	. .	31.5	44.5	57.5	. .	7 50 44.50	2.18	44.07	0.57			
53	Mars . . . S.F.	. .	10.1	23.0	36.0	. .	7 52 23.03	1.05					
54	H. C. . . . 15608	. .	53.5	6.5	19.4	. .	7 53 6.47	2.25	43.44	1.20			
55	Mars . . . N.P.	. .	6.5	19.5	32.4	. .	7 54 19.47	1.67					
56 c	H. C. . . . 15608	. .	51.5	3.5	16.5	. .	7 55 3.83	2.34	44.36	0.67			
57	Mars . . . S.F.	. .	56.0	8.7	21.6	. .	7 56 8.77	1.12½					
58	H. C. . . . 15608	. .	39.3	52.2	5.0	. .	7 56 52.17	2.38	43.40	1.25½			
59	Mars . . . N.P.	. .	47.4	0.3	13.3	. .	7 58 0.33	1.74					
60	H. C. . . . 15608	. .	31.5	44.5	57.3	. .	7 58 44.43	2.46	44.10	0.72			
61	Mars . . . S.F.	. .	50.2	3.0	16.0	. .	8 2 3.07	1.28					
62	H. C. . . 15608	. .	33.3	46.2	59.0	. .	8 2 46.17	2.55	43.10	1.27			
63	Mars . . . N.P.	. .	32.3	45.5	57.6	. .	8 3 45.13	1.92½					
64	H. C. . . . 15608	. .	. .	29.0	41.6	. .	8 4 28.84	2.65	43.71	0.62½			
65	Mars . . . S.F.	. .	17.1	29.9	42.9	. .	8 7 29.97	1.47					
66	H. C. . . . 15608	. .	0.3	13.1	26.1	. .	8 8 13.17	2.78	43.20	1.31			
67	Mars . . . N.P.	. .	17.0	30.0	43.0	. .	8 9 30.00	2.13					
68	H. C. . . . 15608	. .	1.0	13.5	26.5	. .	8 10 13.67	2.92½	43.67	0.78½			
69	Mars . . . S.F.	. .	0.0	13.0	25.8	. .	8 11 12 93	1.65					
70	H. C. . . . 15608	. .	43.2	56.0	8.6	. .	8 12 55.93	3.03	43.00	1.38			
71	Mars . . . N.P.	. .	9.3	22.3	35.3	. .	8 14 22.30	2.30					
72	H. C. . . . 15608	.	53.0	6.0	19.0	. .	8 15 6.00	3.12	43.70	0.82			
73	Mars . . . S.F.	. .	33.0	46.0	59.0	. .	8 16 46.00	1.85½					
74	H. C. . . . 15608	. .	16.0	29.0	42.0	. .	8 17 29.00	3.25	43.00	1.39½			
75	Mars . . . N.P.	. .	6.5	19.6	32.5	. .	8 19 19.53	2.50½					
76	H. C. . . . 15608	. .	50.2	3.2	16.2	. .	8 20 3.20	3.40	43.67	0.89½	28.018	60.5	57.3
77	Mars . . . S.F.	. .	17.5	30.5	43.5	. .	8 21 30.50	2.04½			Ther. att. 69°.2 Bar. red. to 32° F. 27.908		
78	H. C. . . . 15608	. .	0.3	13.3	26.2	. .	8 22 13.27	3.46½	42.77	1.42			
79	Mars . . . N.P.	. .	15.0	28.0	41.0	. .	8 23 28.00	2.75					
80	H. C. . . . 15608	. .	58.5	11.3	24.3	. .	8 24 11.37	+3.60½	—43.37	—0.85½			

MARCH 15, 1852—Continued.

Remarks.

Quite clear; so that several minute stars are discernible which were not seen last night. There is, however, a haze or blur about the planet, and an unsteadiness of motion which somewhat impairs the observations.

a Recorded 46.3*s*. at wire D. *b* Recorded 37.8*s*. at wire D. *c* Recorded 56.5*s*. at wire B.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F. . .	Twenty transits . . .	7 35 54.75	+ 43.726	— 1.104	= 0 21.52
Mean N. P. . .	Twenty transits . . .	7 38 17.68	+ 44.365	— 0.533	= 0 10.39

h. m.	m. s.		h. m. s.
Correction for chronometer at 7 36 . . .	— 5 42.21	Santiago sid. time S. F.	7 30 12.54
Correction for chronometer at 7 38 . . .	— 5 42.22	Santiago sid. time N. P.	7 32 35.46
		Interval	2 22.92

	″		″
Δ P. F. limbs in A. R. reduced to arc . . .	9.58	Δ N. S. limbs micr. in rev.	0.571 = 11.13
Variation of A. R. in 2*m*. 23*s*.	+ 0.80	Variation of declination in 2*m*. 23*s*. .	+ 0.34
Observed P. F. diameter	10.38	Corr. for diam. of micr. wires . . .	— 2.20
		Observed N. S. diameter	9.27

h. m.	″	h. m.	′
Δ ρ at 7 31	0.02	Δ ρ at 7 33	0.01

INFERIOR CONJUNCTIONS OF VENUS, 1850–52.

MICROMETRICAL OBSERVATIONS,

WITH

THE 8½ FEET EQUATORIAL,

AT

THE OBSERVATORY, SANTIAGO, CHILE,

BY THE U. S. NAVAL ASTRONOMICAL EXPEDITION.

INFERIOR CONJUNCTION OF VENUS:

1850-51.

OCTOBER 19, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	. .	. .	27.3	. .	. .	21 39 27.30	+ 0.38			28.022	70.4	61.5
2	H. C. . . . 30556	. .	. .	5.2	. .	. .	21 40 5.20	11.78	—37.90	—11.40			
3	Venus . . . N.P.	. .	45.5	58.5	. .	. .	21 46 58.61	0.71			Ther. att. 68°.0		
4	H. C. . . . 30556	. .	. .	35.5	. .	. .	21 47 35.50	12.12	36.89	11.41	Bar. red. to 32° F.		
5	Venus . . . N.P.	38.5	51.5	4.5	. .	. .	21 50 4.73	1.08			27.915		
6	H. C. . . . 30556	. .	. .	41.2	. .	. .	21 50 41.20	12.53	36.47	11.45			
7	Venus . . . N.P.	. .	0.2	13.4	. .	. .	21 52 13.41	0.93					
8	H. C. . . . 30556	. .	36.0	49.0	. .	. .	21 52 49.11	12.43	35.70	11.50			
9	Venus . . . N.P.	. .	41.0	54.3	. .	. .	21 54 54.26	0.97½					
10 a	H. C. . . . 30556	. .	. .	29.3	. .	. .	21 55 29.30	12.52½	35.04	11.55			
11	Venus . . . N.P.	49.5	. .	16.0	. .	. .	21 57 15.98	0.98					
12	H. C. . . . 30556	. .	38.0	. .	4.2	. .	21 57 51.10	12.59	35.12	11.61			
13	Venus . . . N.P.	. .	32.0	45.0	. .	. .	21 59 45.11	0.84					
14	H. C. . . . 30556	53.5	6.5	19.5	. .	. .	22 0 19.73	12.50½	34.62	11.66½			
15	Venus . . . N.P.	. .	35.8	49.5	. .	. .	22 2 49.26	0.91					
16	H. C. . . . 30556	. .	10.2	23.2	. .	. .	22 3 23.31	12.58	34.05	11.67			
17 b	Venus . . . N.P.	48.5	2.0	. .	. .	. .	22 5 15.09	0.92					
18	H. C. . . . 30556	. .	36.0	. .	2.0	. .	22 5 49.00	12.64	33.91	11.72			
19	Venus . . . N P.	. .	24.5	37.6	. .	. .	22 7 37.66	0.91					
20	H. C. . . . 30556	. .	57.6	11.0	. .	. .	22 8 10.91	12.67	33.25	11.76			
21	Venus . . . N.P.	29.0	. .	55.6	. .	. .	22 9 55.53	0.87½					
22	H. C. . . . 30556	. .	. .	28.5	. .	. .	22 10 28.50	12.66½	32.97	11.79			
23	Venus . . . N.P.	. .	20.6	34.0	. .	. .	22 12 33.91	0.69					
24	H. C. . . . 30556	. .	53.2	6.5	. .	. .	22 13 6.46	12.59	32.55	11.90			
25	Venus . . . N.P.	3.5	17.3	30.5	. .	. .	22 15 30.33	0.62					
26	H. C. . . . 30556	. .	49.5	2.5	. .	. .	22 16 2.61	12.52	32.28	11.90			
27	Venus . . . N P.	. .	47.2	0.5	. .	. .	22 18 0.46	0.57½					
28	H. C. . . . 30556	. .	. .	32.6	. .	. .	22 18 32.60	12.58	32.14	12.00½			
29	Venus . . . N.P.	. .	39.5	52.8	. .	. .	22 20 52.76	0.53					
30	H. C. . . . 30556	. .	11.0	24.2	. .	. .	22 21 24.21	12.67½	31.45	12.14½			
31	Venus . . . N.P.	. .	31.5	44.6	. .	. .	22 26 44.66	0.27½					
32	H. C. . . . 30556	. .	1.8	15.0	. .	. .	22 27 15.01	12.27	30.35	11.99½			
33	Venus . . . N.P.	. .	40.3	53.5	. .	. .	22 29 53.51	0.16½					
34	H. C. . . . 30556	. .	10.0	23.5	. .	. .	22 30 23.36	+12.25½	—29.85	—12.09			

OCTOBER 19, 1850—Continued.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
35	Venus . . . N.P.	. .	50.5	3.6	. .	. .	22 32 3.66	± 0.00			28.022	70.4	61.5
36	H. C. . . . 30556	. .	20.0	33.2	. .	. .	22 32 33.21	+12.01	—29.55	—12.01			
37	Venus . . . N.P.	. .	52.0	5.3	. .	. .	22 35 5.26	1.00			Ther. att. 68°.0 Bar. red. to 32° F. 27.915		
38	H. C. . . . 30556	. .	21.0	35.0	. .	. .	22 35 34.61	13.05	29.35	12.05			
39	Venus . . . N.P.	. .	42.1	55.5	. .	. .	22 37 55.41	1.33					
40	H. C. . . . 30556	. .	. .	23.6	. .	. .	22 38 23.60	13.59	28.19	12.26			
41	Venus . . . N.P.	. .	4.8	18.5	. .	. .	22 40 18.26	1.21					
42	H. C. . . . 30556	. .	. .	46.8	. .	. .	22 40 46.80	13.62	28.54	12.41			
43	Venus . . . N.P.	. .	31.5	44.5	. .	. .	22 42 44.61	1.06					
44	H. C. . . . 30556	. .	. .	12.5	. .	. .	22 43 12.50	13.48½	27.89	12.42½			
45 c	Venus . . . N.P.	41.2	54.5	7.5	. .	. .	22 46 7.66	0.97					
46	H. C. . . . 30556	. .	. .	35.0	. .	. .	22 46 35.00	13.36	27.34	12.39			
47	Venus . . . N.P.	. .	37.5	51.0	. .	. .	22 49 50.86	0.65½					
48	H. C. . . . 30556	. .	. .	18.0	. .	. .	22 50 18.00	13.20	27.14	12.54½			
49	Venus . . . N.P.	. .	51.2	. .	. .	. .	22 54 4.42	0.43					
50	H. C. . . . 30556	. .	. .	30.5	. .	. .	22 54 30.50	13.05½	26.08	12.62½			
51	Venus . . . N.P.	. .	. .	19.0	. .	. .	22 57 19.00	0.20					
52	H. C. . . . 30556	. .	. .	44.3	. .	. .	22 57 44.30	12.81½	25.30	12.61½			
53	Venus . . . N.P.	. .	. .	35.5	. .	. .	22 59 35.50	3.38					
54	H. C. . . . 30556	. .	. .	. .	14.5	. .	23 0 1.29	16.12½	25.79	12.74½			
55	Venus . . . N.P.	. .	. .	9.5	. .	. .	23 2 9.50	3.14½					
56	H. C. . . . 30556	. .	. .	34.0	. .	. .	23 2 34.00	15.92	24.50	12.77½			
57	Venus . . . N.P.	. .	. .	43.2	. .	.	23 4 43.20	2.81½					
58	H. C. . . . 30556	. .	. .	7.2	. .	. .	23 5 7.20	15.61	24.00	12.79½			
59	Venus . . . N.P.	. .	. .	13.5	. .	. .	23 6 13.50	2.50					
60	H. C. . . . 30556	. .	. .	37.4	. .	. .	23 6 37.40	15.34	23.90	12.84			
61	Venus . . . N.P.	. .	. .	7.2	. .	. .	23 10 7.20	2.15			28.044	63.0	53.0
62	H. C. . . . 30556	. .	. .	30.5	. .	. .	23 10 30.50	15.01	23.30	12.86			
63	Venus . . . N.P.	. .	. .	18.8	. .	. .	23 11 18.80	1.93			Ther. att 65°.0 Bar. red. to 32° F. 27.946		
64	H. C. . . . 30556	. .	. .	41.5	. .	. .	23 11 41.50	14.77	22.70	12.84			
65	Venus . . . N.P.	. .	. .	46.4	. .	. .	23 14 46.40	1.37½					
66	H. C. . . . 30556	. .	. .	9.0	. .	. .	23 15 9.00	+14.24½	—22.60	—12.87			

Remarks.

Fine clear night, after a day extremely warm for so early in the season. The planet was tolerably steady until 23*h*. sid. time; after which, the cusps were evidently elongated.

a Recorded 46.0*s*. at wire D.

b Recorded 47.5*s*. at wire A.

c Recorded 44.5*s*. at wire B.

Results.

Mean . . . Thirty-three transits . . .	h. m. s. 22 28 55.03	s. — 30.02 . . .	Rev. — 12.004	′ ″ = 3 53.96
Correction for chronometer at h. m. 22 29 . .	m. s. — 3 4.33	Santiago sid. time N. P.		h. m. s. 22 25 50.70
Δ ρ at h. m. 22 26		″ 0.22		

OCTOBER 20, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m s.	Rev.	m. s.	Rev.	Inches.	°	°
1	W. C.	43.5	56.7	10.0	. .	36.8	21 6 10.01	+5.88			.003	68 8	60.6
2	Venus . . . N.P.	. .	1.2	14.5	28.0	41.5	21 7 14.66	0.98	+1 4.62	—4.90			
3	W. C.	2.5	15.5	28.8	41.5	. .	21 9 28.70	6.35			Ther. at[illegible] 6[illegible]°.2 Ba[illegible] re[illegible] to 3[illegible] 27.896		
4	Venus . . . N.P	. .	20.5	34.2	47.5	. .	21 10 34.07	0.99½	1 5.37	5.36½			
5	W. C.	47.2	0.5	13.5	. .	. .	21 18 13.65	6.93					
6 a	Venus . . . N.P.	53.5	6.5	19.6	. .	. .	21 19 19.78	1.52	1 6.13	5.41			
7	W. C.	52.2	5.6	19.0	. .	. .	21 21 18.85	7.08½					
8	Venus . . . N P.	59.5	12.5	26.0	. .	. .	21 22 25.92	1.45	1 7.07	5.63½			
9	W. C.	58.5	11.2	21.6	. .	. .	21 24 24.68	7.09					
10 b	Venus . . . N P.	5.6	19.0	32.0	. .	. .	21 25 32.12	1.31½	1 7.44	5.77½			
11	W. C.	4.4	17.5	30.5	. .	. .	21 28 30.72	7.07½					
12	Venus . . . N.P.	12.0	25.5	38.8	. .	. .	21 29 38.68	1.30	1 7.96	5.77½			
13	W. C.	38 0	51.2	4.5	. .	. .	21 31 4.48	7.06½					
14	Venus . . . N.P.	46.2	59.5	13.0	. .	. .	21 32 12.82	1.22	1 8.34	5.84½			
15	W. C.	38 5	51.5	4.5	. .	. .	21 34 4.75	7.13					
16	Venus . . . N.P.	47.2	0.5	13.8	. .	. .	21 35 13.75	1.17½	1 9.00	5.95½			
17	W. C.	40.2	53.5	7.0	. .	. .	21 38 6.82	7.17½					
18	Venus . . . N.P.	50.5	3.5	16.6	. .	. .	21 39 16.78	1.11½	1 9.96	6.06			
19	W. C.	45.5	58.6	12.2	25.0	. .	21 41 11.95	7.07½					
20	Venus . . . N.P.	55.2	9.0	22.3	35.5	. .	21 42 22.13	1.13	1 10.18	5.94½			
21	W. C.	37.6	51.0	4.5	17.5	. .	21 44 4.28	7.15½					
22	Venus . . . N.P.	48.2	2.0	15.5	28.6	42.3	21 45 15.32	1.09	1 11.04	6.06½			
23	W. C.	35.2	48.5	1.5	15.0	. .	21 47 1.68	7.16½					
24 c	Venus . . . N P.	46.0	59.5	13.0	26.5	40.3	21 48 13.06	1.00½	1 11.38	6.16			
25	W. C.	53.5	7.0	20.0	33.0	. .	21 51 20.00	7.18					
26	Venus . . . N.P.	5.5	18.6	32.0	45.2	58.6	21 52 31.98	0.90½	1 11.93	6.27½			
27	W. C.	15.5	29.0	42.0	55 0	. .	21 54 42.00	7.06½					
28	Venus . . . N.P.	27.5	41.0	54.5	7.5	20.8	21 55 54.26	0.84½	1 12.26	6.22			
29	W. C.	25.5	39.2	52.5	5.5	. .	21 57 52.30	7.12½					
30	Venus . . . N.P.	38.6	52.0	5.5	18.5	32.2	21 59 5.36	0.72	1 13.06	6.40½			
31	W. C.	53.2	6.5	. .	33.0	. .	22 1 19.74	7.00½					
32	Venus . . . N.P.	6.5	19.6	33.0	46.3	59.5	22 2 32.93	0.55	1 13.24	6.45½			
33	W. C.	21.5	35.0	48.0	1.5	. .	22 4 48.13	7.15					
34 d	Venus . . . N.P.	35.5	48.6	2.3	15.5	28.6	22 6 2.10	0.63	1 13.97	6.52			
35	W. C.	1.2	14.5	27.5	40.8	. .	22 10 27.63	7.18½					
36	Venus . . . N.P.	16.0	29.5	42.5	56.0	9.4	22 11 42.68	0.57	1 15.05	6.61½			
37	W. C.	48.2	1.5	14.5	27.5	. .	22 14 14.55	7.16					
38	Venus . . . N P.	3.5	16.8	30.3	43.5	57.0	22 15 30.22	0.48½	1 15.67	6.67½			
39	W. C.	33.0	46.2	59.5	12.5	. .	22 17 59.43	7.01½					
40	Venus . . . N.P.	48.2	1.8	15.2	28.2	41.7	22 19 15.02	0.38	1 15.59	6.63½			
41	W. C.	5.0	18.5	31.5	44.6	. .	22 21 31.53	7.08					
42	Venus . . . N P.	21.8	. .	48.5	1.5	15.0	22 22 48.38	0.26½	1 16.85	6.81½			
43	W. C.	55.3	8.5	21.5	34.6	. .	22 25 21.60	7.04					
44	Venus . . . N.P.	12.5	25.5	38.8	52.4	5.5	22 26 38.94	0.20	1 17.34	6.81			
45	W. C.	14.5	28.0	41.2	54.5	. .	22 29 41.18	+6.94½					
46	Venus . . . N.P.	32.0	45.5	59.0	12.5	25.8	22 30 58.96	±0.00	+1 17.78	—6.94½			

OCTOBER 20, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometer. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	W. C.	3.0	16.3	29.5	42.7	. .	22 33 29.50	+8.51			28.029	62.7	58.3
48	Venus . . . N.P.	21.0	34.3	47.5	1.0	14.5	22 34 47.66	1.51	+1 18.16	—7.00			
49	W. C.	17.5	30.5	43.7	56.9	. .	22 37 43 78	8.59			Ther. att. 66°.0		
50	Venus . . . N.P.	35.2	49.5	2.5	16.0	29.6	22 39 2.56	1.50	1 18.78	7.09	Bar. red. to 32° F. 27.928		
51	W. C.	41.3	57.5	10.6	21.0	. .	22 41 10.73	8.42					
52	Venus . . . N.P.	3.6	17.2	30.5	43.8	57.4	22 42 30.50	1.34	1 19.77	7.08			
53	W. C.	23.5	36.8	50.0	3.0	. .	22 44 49.95	8.36½					
54	Venus . . . N.P.	43.8	57.2	10.5	23.8	37.2	22 46 10.50	1.24½	1 20.55	7.12			
55	W. C.	1.5	14.5	27.8	41.0	. .	22 48 27.83	8.31½					
56	Venus . . . N.P.	21.2	35.2	48.5	1.5	15.0	22 49 48.28	1.03	1 20.45	7.28½			
57	W. C.	56.2	9.5	22.6	36.0	. .	22 52 22.70	8.12½					
58 e	Venus . . . N.P.	17.2	30.5	44.0	57.3	10.6	22 53 43.92	0.73	1 21.22	7.39½			
59	W. C.	13.2	26.5	40.0	53.0	. .	22 56 39.80	7.87½					
60 e	Venus . . . N.P.	35.5	49.0	2.3	15.5	29.0	22 58 2.26	0.45½	1 22.46	7.42			
61	W. C.	20.0	33.0	46.2	59.5	. .	23 2 46.30	8.96					
62 e	Venus . . . N.P.	42.5	55.5	9.0	22.5	35.8	23 4 9.06	1.41½	1 22.73	7.54½			
63	W. C.	46.3	59.5	12.5	26.2	. .	23 8 12.75	8.40½					
64	Venus . . . N.P.	9.5	23.2	36.5	50.0	3.5	23 9 36.54	0.71½	1 23.79	7.69			
65	W. C.	54.0	. .	20.5	33.5	. .	22 12 20.43	7.91					
66	Venus . . . N.P.	18.5	31.5	44.6	58.0	11.5	23 13 41.82	0.17	1 24.39	7.74			
67	W. C.	55.6	9.0	22.2	35.5	. .	23 17 22.20	8.22					
68	Venus . . . N.P.	20.5	34.0	47.5	1.0	14.5	23 18 47.50	0.40	1 25.30	7.82			
69	W. C.	24.6	38.0	51.5	4.8	. .	23 20 51.35	9.42					
70 f	Venus . . . N.P.	50.5	3.6	17.5	30.7	44.3	23 22 17.32	1.56	1 25.97	7.86			
71	W. C.	31.5	41.5	58.0	11.2	. .	23 25 57.93	8.51½					
72	Venus . . . N.P.	58.0	. .	21.6	38.2	51.6	23 27 21.78	+0.72½	+1 26.85	—7.79			

Remarks.

There is some haze about the horizon, and the night is fair; but, as last night, the planet became unsteady about 23 hours sid. time.

a Recorded 20.6s. at wire C.
b Recorded 31.5s. at wire C.
c Recorded 13.5s. at wire C.
d Recorded 31.5s. at wire A.
e Tremulous.
f Indifferent; star barely visible.

Results.

Mean . . . Thirty-six transits . .	h m. s. 22 15 0.71	m. s. +1 15.33	Rev. —6.615	′ ″ =2 8 93

Correction for chronometer at 22 15 (h. m.) . . . —3 5.57 (m. s.) Santiago sid. time N. P. . . . . 22 11 55.14 (h. m. s.)

Δ ρ at 22 11 (h. m.) . . . . 0.08″

OCTOBER 21, 1850.

Cloudy.

OCTOBER 22, 1850.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1 *a*	Venus . . . N.P.	. .	44.3	. .	. .	. .	21 6 57.57	—2.46			28.026	67.2	57.6
2	W. C.	. .	12.0	. .	. .	. .	21 7 25.27	12.38½	—27.70	+9.92½			
3	Venus . . . N.P.	6.5	. .	33.0	. .	. .	21 28 33.04	0.80			Ther. att. 67°.0		
4	W. C.	. .	44.5	. .	11.2	24.6	21 28 57.89	10.42½	24.85	9.62½	Bar. red. to 32° F.		
5	Venus . . . N.P.	41.5	54.5	. .	. .	. .	21 31 7.92	0.86			27.922		
6	W. C.	. .	18.8	32.5	. .	58.8	21 31 32.39	10.44½	24.47	9.58½			
7	Venus . . . N P.	56.5	9.6	. .	37.5	. .	21 40 23.40	0.97½					
8	W. C.	. .	. .	46.5	59.5	13.0	21 40 46.37	10.58	22.97	9.60½			
9	Venus . . . N.P.	26.2	39.5	. .	. .	. .	21 42 52.77	1.09½					
10	W. C.	. .	2.0	15.5	. .	42.0	21 43 15.52	10.58	22.75	9.48½			
11	Venus . . . N.P.	41.6	55.5	. .	. .	. .	21 45 8.47	1.22					
12	W. C.	. .	17.5	31.0	44.0	. .	21 45 30.84	10.60	22.37	9.38			
13	Venus . . . N.P.	46.5	59.8	. .	. .	. .	21 47 13.07	1.16					
14	W. C.	. .	21.5	35.0	48.2	. .	21 47 34.90	10.57	21.83	9.41			
15	Venus . . . N.P.	9.5	22.7	. .	. .	. .	21 49 36.02	1.42					
16	W. C.	. .	44.4	57.6	10.5	. .	21 49 57.50	10.92	21.48	9.50			
17	Venus . . . N.P.	. .	. .	50.0	. .	. .	21 51 50.00	1.58					
18	W. C.	. .	. .	11.3	. .	. .	21 52 11.30	10.92½	21.30	9.34½			
19	Venus . . . N.P.	23.8	37.3	. .	. .	. .	21 53 50.47	1.72					
20	W. C.	. .	57.5	11.0	24.3	. .	21 54 10.94	10.95	20.47	9.23			
21	Venus . . . N.P.	18.0	31.5	44.6	. .	. .	21 56 44.65	1.66					
22	W. C.	. .	. .	4.5	18.1	. .	21 57 4.67	10.97½	20.02	9.31½			
23	Venus . . . N.P.	14.5	28.0	. .	. .	. .	21 58 41.17	1.79					
24 *b*	W. C.	. .	47.8	1.5	15.0	. .	21 59 1.44	10.96½	20.27	9.17½			
25	Venus . . . N.P.	35.2	48.8	2.0	. .	. .	22 1 1.95	1.82					
26	W. C.	. .	. .	21.5	35.2	. .	22 1 21.72	10.97½	19.77	9.15½			
27	Venus . . . N.P.	3.2	16.8	. .	. .	. .	22 3 29.92	1.84					
28	W. C.	. .	35.7	49.5	. .	16.0	22 3 49.42	10.94	19.50	9.10			
29	Venus . . . N.P.	4.2	17.5	. .	. .	. .	22 5 30.77	1.86					
30	W. C.	. .	. .	49.6	3.0	16.5	22 5 49.73	11.01	18.96	9.15			
31	Venus . . . N.P.	36.5	50.2	. .	. .	. .	22 8 3.27	1.91					
32	W. C.	. .	. .	22.0	35.0	48.5	22 8 21.87	10.96	18.60	9.05			
33	Venus . . N.P.	21.2	34.8	. .	. .	. .	23 11 47.92	1.97					
34	W. C.	. .	52.5	6.0	19.5	. .	22 12 6.00	11.00	18.08	9.03			
35	Venus . . . N.P.	24.0	37.5	. .	. .	. .	22 12 50.67	1.98½					
36	W. C.	. .	55.0	8.5	21.5	. .	22 13 8.34	10.96½	17.67	8.98			
37	Venus . . . N.P.	39.5	53.2	. .	. .	. .	22 15 6.27	2 02					
38	W. C.	. .	. .	24.2	37.5	. .	22 15 24.22	10.95½	17.95	8.93½			
39	Venus . . . N.P.	46.0	59.5	. .	. .	. .	22 17 12.67	2.05½					
40	W. C.	. .	. .	29.5	43.2	. .	22 17 29.72	10.95	17.05	8.89½			
41	Venus . . . N.P.	9.8	23.2	. .	. .	. .	22 19 36.42	2.05½					
42	W. C.	. .	. .	53.8	6.5	. .	22 19 53.52	10.91	17.10	8.85½			
43	Venus . . . N.P.	. .	10.8	. .	37.5	. .	22 21 24.15	2.03					
44	W. C.	. .	. .	. .	53.5	7.2	22 21 40.40	10.96	16.25	8.93			
45	Venus . . . N.P.	9.8	23.0	. .	50.0	. .	22 24 36.46	2.02					
46	W. C.	. .	. .	52.5	. .	19.5	22 24 52.68	—10.97½	—16.22	+8.95½			

OCTOBER 22, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
47	Venus . . . N.P.	22.5	36.0	. .	. .	. .	22 26 49.17	—2.26			28.026	67.2	57.6
48	W. C.	. .	. .	. .	17.5	31.5	22 27 4.55	11.06	—15.38	+8.80			
49	Venus . . . N.P.	10.5	24.0	. .	. .	. .	22 30 37.17	2.27			Ther. att. 67°.0 Bar. red. to 32° F. 27.922		
50	W. C.	. .	. .	52.3	5.5	. .	22 30 52.27	11.01	15.10	8.74			
51	Venus . . . N.P.	17.5	30.8	. .	. .	. .	22 32 41.07	2.36					
52	W. C.	. .	. .	59.0	12.2	. .	22 32 58.97	11.03	14.90	8.67			
53 *c*	Venus . . . N.P.	2.5	16.2	. .	. .	. .	22 34 29.27	2.45					
54	W. C.	. .	. .	43.7	56.8	. .	22 34 43.62	11.11½	14.35	8.66½			
55	Venus . . . N.P.	43.5	57.0	. .	.	. .	22 38 10.17	0.70½					
56	W. C.	. .	. .	24.6	37.3	. .	22 38 24.32	9.35	14.15	8.64½			
57	Venus . . . N.P.	17.0	30.5	. .	. .	. .	22 40 43.67	0.22					
58	W. C.	. .	. .	57.5	10.5	23.8	22 40 57.30	8.82½	13.63	8.60½			
59	Venus . . . N.P.	55.0	8.5	. .	. .	. .	22 45 21.67	0.15					
60	W. C.	. .	. .	34.6	47.5	. .	22 45 34.42	8.75	12.75	8.60			
61	Venus . . . N.P.	14.0	27.5	. .	. .	. .	22 47 40.67	0.26					
62	W. C.	. .	. .	53.2	6.5	. .	22 47 53.22	8.73	12.55	8.47			
63	Venus . . . N.P.	2.5	15.8	. .	. .	. .	22 50 29.07	0.21					
64	W. C.	. .	. .	41.6	54.5	. .	22 50 41.42	8.62	12.35	8.41			
65	Venus . . . N.P.	8.5	21.8	. .	. .	. .	22 52 35.07	0.23					
66	W. C.	. .	. .	46.8	0.0	13.5	22 52 46.80	8.57	11.73	8.34			
67	Venus . . . N.P.	13.5	27.1	. .	. .	. .	22 54 40.22	0.32					
68	W. C.	. .	. .	52.0	. .	18.8	22 54 52.08	8.67	11.86	8.35			
69	Venus . . . N.P.	30.3	43.5	. .	. .	. .	22 56 56.82	0.47					
70	W. C.	. .	. .	7.5	21.0	. .	22 57 7.62	8.71½	10.80	8.24½			
71	Venus . . . N.P.	35.5	48.8	. .	. .	. .	22 59 2.07	0.44					
72	W. C.	. .	. .	13.0	26.2	39.8	22 59 13.03	8.81½	10.96	8.37½			
73	Venus . . . N.P.	26.5	40.0	. .	. .	. .	23 1 53.17	0.67½					
74	W. C.	. .	. .	3.5	16.8	30.4	23 2 3.60	8.94	10.43	8.26½			
75 *d*	Venus . . . N.P.	53.5	7.0	. .	. .	. .	23 5 20.17	0.81½					
76	W. C.	. .	. .	30.5	44.0	57.5	23 5 30.70	8.86	10·53	8.04½			
77	Venus . . . N.P.	4.3	17.6	. .	. .	. .	23 6 30.87	0.88					
78	W. C.	. .	. .	40.5	53.5	7.5	23 6 40.53	8.98	9.66	8.10			
79	Venus . . . N.P.	35.5	49.0	. .	. .	. .	23 9 2.17	0.98					
80	W. C.	. .	. .	12.0	25.0	38.5	23 9 11.87	9.07½	9.70	8.09½			
81 *e*	Venus . . . N.P.	48.5	1.8	. .	. .	. .	23 11 15.07	1.09					
82	W. C.	. .	. .	24.5	37.5	51.0	23 11 24.37	9.22½	9.30	8.13½			
83	Venus . . . N.P.	7.5	21.0	. .	. .	. .	23 13 34.17	1.18			28.044	64.5	54.7
84	W. C.	. .	. .	42.5	56.0	9.5	23 13 42.70	9.28	8.53	8.10			
85	Venus . . . N.P.	15.5	29.0	. .	. .	. .	23 15 42.17	1.34			Ther. att. 65°.2 Bar. red. to 32° F. 27.946		
86	W. C.	. .	. .	. .	4.0	17.5	23 15 50.80	9.42	8.63	8.08			
87	Venus . . . N.P.	54.0	7.5	. .	. .	. .	23 18 20.67	1.52					
88	W. C.	. .	. .	28.5	42.0	55.0	23 18 28.53	—9.49½	—7.86	+7.97½			

OCTOBER 22, 1850—Continued.

Remarks.

Much moisture in the atmosphere, and the clouds hang low on the Andes. After those to the westward cleared away, the planet and star were beautifully distinct and steady for the earlier observations.

a The planet and star seen through clouds.
b Recorded 2.0s. at wire C.
c Tremulous.
d Bad observations.
e Very tremulous and flaring.

All the observations of the star to No. 56, inclusive, were recorded 1 rev. too little.

Results.

	h. m. s.	s.	Rev.	′ ″
Mean . . . Forty-four transits . . .	22 24 13.06	— 17.36	+ 8.826	= 2 52.02

	m. s.		h. m. s.
Correction for chronometer at 22h 24m . .	— 3 8.26	Santiago sid. time N. P.	22 21 4.80

Δ ρ at 22h 21m . . . . 0″.15

OCTOBER 23, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	W. C.	1.0	14.0	27.5	. .	. .	21 33 27.45	± 0.00			28.000	68.0	57.2
2	Venus . . . N.P.	37.0	49.0	3.0	16.0	29.5	21 34 2.90	—20.20½	+35.45	—20.20½			
3	W. C.	3.5	16.7	30.0	. .	. .	21 36 30.02	± 0.00			Ther. att. 64°.0 Bar. red. to 32° F. 27.905		
4	Venus . . . N.P.	38.7	52.5	5.5	19.0	32.5	21 37 5.64	—20.37	35.62	20.37			
5 *a*	W. C.	13.5	26.5	40.0	. .	. .	21 38 39.95	± 0.00					
6	Venus . . . N.P.	49.0	2.0	15.5	29.0	42.0	21 39 15.50	—20.46	35.55	20.46			
7	W. C.	. .	3.0	15.7	. .	. .	21 41 15.99	± 0.00					
8	Venus . . . N.P.	25.0	38.7	52.0	5.0	19.0	21 41 51.94	—20.28	35 95	20.28			
9	W. C.	16.5	30.0	43.0	. .	. .	21 43 43.12	± 0.00					
10	Venus . . . N.P.	53.0	6.0	20.0	33.0	46.0	21 44 19.60	—20.22½	36.48	20.22½			
11	W. C.	17.0	30.0	43.0	. .	. .	21 45 43.28	± 0.00					
12	Venus . . . N.P.	. .	7.0	20.0	33.5	47.0	21 46 20.21	—20.28	36.93	20.28			
13 *b*	W. C.	13.0	26.0	39.5	. .	. .	21 48 39.45	± 0.00					
14	Venus . . . N.P.	50.5	4.0	17.0	30.5	44.0	21 49 17.20	—20.38	37.75	20.38			
15 *b*	W. C.	. .	46.0	59.5	. .	. .	21 50 59.39	± 0.00					
16	Venus . . . N.P.	10.5	24.0	37.0	50.5	4.0	21 51 37.20	—20.38	37.81	20.38			
17	W. C.	5.5	19.0	32.5	. .	. .	21 53 32.28	± 0.00					
18	Venus . . . N.P.	. .	57.0	10.0	23.5	37.0	21 54 10.21	—20.44	37.93	20.44			
19 *c*	W. C.	. .	36.0	49.0	1.5	. .	21 55 48.84	± 0.00					
20	Venus . . . N.P.	1.5	14.5	28.0	41.0	54.5	21 56 27.90	—20.46	39.06	20.46			
21	W. C.	9.0	22.0	35.3	. .	. .	21 58 35.45	± 0.00					
22	Venus . . . N.P.	48.0	1.5	14.5	27.5	41.0	21 59 14.50	—20.58	39.05	20.58			
23	W. C.	. .	9.0	22.0	35.5	. .	22 1 22.17	± 0.00					
24	Venus . . . N.P.	. .	48.5	2.0	15.0	29.0	22 2 1.96	—20 62	39.79	20.62			
25 *b*	W. C.	35.5	49.0	2.0	15.0	. .	22 4 2.02	± 0.00					
26	Venus . . . N.P.	. .	29.0	42.0	55.0	9.0	22 4 42.09	—20.70½	40.07	20.70½			
27	W. C.	52.0	5.0	18.5	32.0	. .	22 6 18.52	± 0.00					
28	Venus . . . N.P.	. .	45.0	58.0	11.5	25.5	22 6 58.31	—20.69	39.82	20.69			
29	W. C.	14.5	28.0	41.0	54.0	. .	22 8 41.02	± 0.00					
30	Venus . . . N.P.	. .	8.5	22.0	35.0	48.0	22 9 21.71	—20.75	+40.69	—20.75			

OCTOBER 23, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
31 d	W. C.	23.5	37.0	50.5	3.5	. .	22 10 50.28	± 0.00			28.000	68.0	57.2
32	Venus . . . N.P.	. .	18.0	31.0	44.0	57.5	22 11 30.96	—20.75	+40.68	—20.75			
33 b	W. C.	29.0	43.0	56.0	9.5	. .	22 13 56.02	± 0.00			Ther att. 64°.0		
34	Venus . . . N.P.	11.0	24.0	37.5	51.0	4.0	22 14 37.50	—20.37	41.48	20.78	Bar. red. to 32° F.		
35	W. C.	39.0	52.5	6.0	19.0	. .	22 16 5.77	± 0.00			27.905		
36	Venus . . . N.P.	21.0	34.0	47.0	0.5	14.0	22 16 47.30	—20.78	41.53	20.78			
37	W. C.	58.0	11.0	24.5	38.0	. .	22 18 24.52	± 0.00					
38	Venus . . . N.P.	40.0	53.0	6.0	19.5	33.0	22 19 6.30	—20.85½	41.78	20.85½			
39	W. C.	18.0	31.0	44.0	57.0	. .	22 20 44.15	± 0.00					
40	Venus . . . N.P.	0.0	13.0	26.0	39.5	53.0	22 21 26.30	—20.85½	42.15	20.85½			
41 e	W. C.	37.0	50.5	3.5	17.0	. .	22 23 3.65	± 0.00					
42	Venus . . . N.P.	20.0	33.0	46.0	59.5	13.0	22 23 46.30	—20.85½	42.65	20.85½			
43	W. C.	5.5	19.0	32.5	46.0	. .	22 25 32.40	± 0.00					
44	Venus . . . N.P.	49.0	2 0	15.5	29.0	42.0	22 26 15.50	—21.01	43.10	21.01			
45	W. C.	40.5	54.0	7 0	20.0	. .	22 28 7.02	± 0.00					
46	Venus . . . N.P.	23.7	37.0	50.0	3.5	17.0	22 28 50.24	—20.92½	43.22	20.92½			
47	W. C.	11.5	25.0	38.0	51.0	. .	22 30 38.02	± 0.00					
48	Venus . . . N.P.	55.2	8.5	22.0	35.0	48.0	22 31 21.74	—21.04	43.72	21.04			
49	W. C.	42.0	55.5	9.0	22.0	. .	22 33 8.77	± 0.00					
50 f	Venus . . . N.P.	26.5	40.0	53.5	6.5	20.0	22 33 53.30	—21.06	44.53	21.06			
51	W. C.	3.5	17.0	30.0	43.0	. .	22 35 30.02	± 0.00					
52	Venus . . . N.P.	48.0	1.0	14.5	28.0	41.5	22 36 14.60	—21.09	44.58	21.09			
53 h	W. C.	41.0	54.0	7.5	20.5	. .	22 38 7.40	± 0.00					
54	Venus . . . N.P.	25.5	39.0	52.0	5.5	19.0	22 38 52.20	—21.11½	44.80	21.11½			
55	W. C.	4.0	17.0	30.5	44.0	. .	22 40 30.52	± 0.00					
56	Venus . . . N.P.	49.0	2.5	16.0	29.0	42.5	22 41 15.80	—21.15½	45.28	21.15½			
57	W. C.	19.5	33.0	46.0	59.5	. .	22 42 46.15	± 0.00					
58	Venus . . . N.P.	5.0	18.5	32.0	45.0	58.0	22 43 31.70	—21.21½	45.55	21.21½			
59	W. C.	35.0	48.5	2.0	15.5	. .	22 45 1.90	± 0.00					
60 g	Venus . . . N.P.	21.5	35.0	48.0	1.0	14.0	22 45 47.90	—21.23	46.00	21.23			
61	W. C.	0.5	14.0	27.0	40.5	. .	22 47 27.15	± 0.00					
62	Venus . . . N.P.	47.0	0.5	13.5	27.0	40.0	22 48 13.60	—21.23	46.45	21.23			
63 h	W. C.	16.5	29.5	43.0	56.0	. .	22 49 42.90	± 0.00					
64	Venus . . . N.P.	2.7	16.5	30.0	43.0	56.0	22 50 29.64	—21.23½	46.74	21.23½			
65	W. C.	55.5	9.0	22.5	35.5	. .	22 53 22.27	± 0.00					
66	Venus . . . N.P.	43.0	56.0	9.5	23.0	36.5	22 54 9.60	—21.34	47.33	21.34			
67	W. C.	32.0	45.0	59.0	12.0	. .	22 55 58.65	± 0.00					
68	Venus . . . N.P.	19.5	33.0	46.5	59.5	13.5	22 56 46.40	—21.37	47.75	21.37			
69	W. C.	56.5	10.0	23.0	36.5	. .	22 58 23.15	± 0.00					
70	Venus . . . N.P.	44.5	58.0	11.0	24.5	38.0	22 59 11.20	—21.40	48.05	21.40			
71	W. C.	14.0	27.0	40.5	54.0	. .	23 0 40.52	± 0.00					
72	Venus . . . N.P.	2.5	16.0	29.5	43.0	56.0	23 1 29.40	—21.41	48.88	21.41			
73	W. C.	21.0	34.5	48.0	1.0	. .	23 3 47.77	± 0.00					
74	Venus . . . N.P.	10.0	23.5	36.5	50.0	3.0	23 4 36.60	—21.44	48.83	21.44			
75	W. C.	54.0	7.0	21.0	34.0	. .	23 6 20.65	± 0.00					
76	Venus . . . N.P.	43.0	57.0	10.0	23.0	36.5	23 7 9.90	—21.44	+49.25	—21.44			

OCTOBER 23, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δα.	Δδ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
77	W. C.	14.0	27.0	40.0	53.5	. .	23 8 40.27	±0.00			28.050	59.0	51.8
78	Venus . . . N.P.	3.0	16.5	30.0	43.0	57.0	23 9 29 90	—21.51	+49.63	—21.51	Ther. att.		
79	W. C.	. .	16.0	29.0	42.0	55.5	23 11 28.96	±0.00			64°.0 Bar. red.		
80	Venus . . . N.P.	. .	5.5	19.0	32.0	45.5	23 12 18.84	—21.55	+49.88	—21.55	to 32° F. 27.955		

Remarks.

A tolerably fair night, though with some haze. The time was noted by Lieut. Herndon, U. S. N.

a Recorded 26.0s. at wire B.
b Good measures.
c Recorded 50.0s. at wire C.
d Excellent observations.
e Recorded 3.0s. at wire C.
f Not good time.
g Blurred.
h Tremulous.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean	Forty transits . . .	22 22 50.99	+ 42.54	— 20.887	= 6 47.09

Correction for chronometer at 22 h. 23 m. . . — 3 m. 9.09 s.   Santiago sid. time N. P. . . . . 22 h. 19 m. 41.90 s.

Δ ρ at 22 h. 19 m. . . . . 0″.26

OCTOBER 24, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δα	Δδ	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	52.5	6.0	19.5	. .	. .	21 14 19.31	+2.33			28.042	65.6	55.5
2	W. C.	. .	57.5	. .	24.5	. .	21 15 11.00	7.12½	—51.69	—4.79½			
3	Venus . . . N.P.	41.5	54.8	8.2	. .	. .	21 18 8.14	2.39			Ther. att. 65°.5		
4	W. C.	. .	45.6	59.0	12.5	. .	21 18 59.04	7.04½	50.90	4.65½	Bar. red. to 32° F. 27.943		
5	Venus . . . N.P.	25.2	38.5	52.0	. .	. .	21 26 51.88	1.64					
6	W. C.	. .	28.2	. .	54.6	8.0	21 27 41.37	6.52½	49.49	4.88½			
7	Venus . . . N.P.	12.9	26.2	39.5	. .	. .	21 29 39.51	1.29					
8	W. C.	2.0	15.3	28.5	. .	. .	21 30 28.58	6.21	49.07	4.92			
9	Venus . . . N.P.	58.2	11.6	25.0	. .	. .	21 32 24.91	1.17					
10	W. C.	47.0	0.5	13.6	. .	. .	21 33 13.68	6.10	48.77	4.93			
11	Venus . . . N.P.	6.8	20.3	33.5	. .	. .	21 35 33.51	0.83					
12	W. C.	. .	8.5	21.6	35.0	48.4	21 36 21.70	5.86½	48.19	5.03½			
13 *a*	Venus . . . N.P.	3.4	16.8	30.3	. .	. .	21 38 30.14	0.79½					
14	W. C.	51.0	4.5	18.2	31.2	44.5	21 39 17.88	5.87	47.74	5.07½			
15 *a*	Venus . . . N.P.	37.6	51.3	4.5	. .	. .	21 41 4.44	0.75					
16	W. C.	25.5	38.8	52.2	5.5	18.8	21 41 52.16	5.82	47.72	5.07			
17 *a*	Venus . . . N.P.	7.8	21.2	34.6	. .	. .	21 43 34.51	0.72					
18	W. C.	55.0	8.3	21.6	35.0	48.4	21 44 21.66	5.79	47.15	5.07			
19 *a*	Venus . . . N.P.	1.0	14.5	27.6	. .	. .	21 46 27.68	0.77					
20	W. C.	47.6	1.0	14.2	27.7	41.0	21 47 14.30	+5.85	—46.62	—5 08			

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
21	Venus . . . N.P.	47.5	1.0	14.5	27.6	. .	21 49 14.31	+0.68			28.042	65.6	55.5
22	W. C.	. .	. .	0.5	13.5	27.0	21 50 0.34	5.83	—46.03	—5.15			
23	Venus . . . N.P.	38.8	52.2	5.5	. .	. .	21 52 5.48	0.64			Ther. att. 65°.5		
24	W. C.	24.5	37.8	51.3	4.5	18.0	21 52 51.22	5.82½	45.74	5.18½	Bar. red. to 32° F. 27.913		
25	Venus . . . N.P.	16.0	29.5	42.8	. .	. .	21 54 42.74	0.50					
26	W. C.	1.5	14.7	28.0	41.5	55.0	21 55 28.14	5.76	45.30	5.26			
27	Venus . . . N.P.	58.0	11.5	25.0	. .	. .	21 57 24.81	0.48					
28	W. C.	43.0	56.5	9.6	23.0	36.5	21 58 9.72	5.78	44.91	5.30			
29	Venus . . . N.P.	32.3	45.6	59.2	. .	. .	21 59 59.01	0.41					
30	W. C.	17.0	30.3	43.7	. .	10.5	22 0 43.68	5.80½	44.67	5.39½			
31	Venus . . . N.P.	12.5	26.2	39.5	. .	. .	22 2 39.38	0.29					
32	W. C.	56.5	10.0	23.5	33.8	50.2	22 3 23.40	5.67	44.02	5.38			
33	Venus . . . N.P.	46.0	59.5	12.8	. .	. .	22 5 12.74	0.19					
34	W. C.	. .	43.2	56.3	9.5	23.3	22 5 56.40	5.68	43.66	5.49			
35	Venus . . . N.P.	49.5	3.0	16.2	. .	. .	22 7 16.21	0.17					
36	W. C.	32.0	45.5	. .	12.8	26.3	22 8 59.10	5.62	42.89	5.45			
37	Venus . . . N.P.	51.5	5.0	18.4	. .	. .	22 11 18.28	0.04½					
38	W. C.	. .	47.8	1.0	14.5	28.0	22 12 1.15	+5.58	42.87	5.53½			
39	Venus . . . N.P.	37.5	51.0	4.2	. .	. .	22 14 4.21	±0.00					
40	W. C.	. .	33.5	46.5	0.2	13.5	22 14 46.75	+5.57	42.54	5.57			
41	Venus . . . N.P.	39.0	52.6	6.2	. .	. .	22 17 5.91	—0.10					
42	W. C.	. .	34.8	48.3	1.5	15.0	22 17 48.23	+5.44½	42.32	5.54½			
43	Venus . . . N.P.	14.5	28.2	41.5	. .	. .	22 22 41.38	1.06					
44	W. C.	. .	9.5	22.7	36.0	49.3	22 23 22.70	6.76½	41.32	5.70½			
45	Venus . . . N.P.	24.6	38.3	51.8	. .	. .	22 25 51.54	0.71					
46	W. C.	. .	19.1	32.2	45.5	59.0	22 26 32.28	6.38	40.74	5.67			
47	Venus . . . N.P.	57.5	10.7	24.3	. .	. .	22 28 24.14	0.72½					
48	W. C.	. .	51.2	4.4	17.5	31.2	22 29 4.40	6.49½	40.26	5.77			
49	Venus . . . N.P.	36.0	49.4	2.8	. .	. .	22 31 2.71	0.61					
50	W. C.	. .	29.3	42.6	. .	9.5	22 31 42.66	6.49	39.95	5.88			
51	Venus . . . N.P.	39.6	52.8	6.2	. .	. .	22 34 6.18	0.60					
52	W. C.	. .	32.2	45.7	58.8	12.5	22 34 45.63	6.44½	39.45	5.84½			
53	Venus . . . N.P.	8.7	22.3	35.5	. .	. .	22 37 35.48	0.51					
54	W. C.	. .	1.0	14.5	27.5	41.0	22 38 14.33	6.24½	38.85	5.73½			
55	Venus . . . N.P.	34.0	47.5	1.0	. .	. .	22 40 0.81	0.42					
56	W. C.	. .	26.3	39.5	52.6	6.2	22 40 39.48	6.33½	38.67	5.91½			
57	Venus . . . N.P.	5.0	18.5	32.0	. .	. .	22 42 31.81	0.36					
58	W. C.	. .	56.7	10.0	23.5	36.8	22 43 10.08	6.24½	38.27	5.88½			
59	Venus . . . N.P.	43.0	56.5	9.7	. .	. .	22 45 9.71	0.29					
60	W. C.	. .	34.3	47.5	0.5	14.0	22 45 47.40	6.25	37.69	5.96			
61 b	Venus . . . N.P.	24.0	36.5	49.8	. .	. .	22 47 50.08	0.28½					
62 c	W. C.	. .	14.0	27.2	40.5	53.8	22 48 27.20	6.20	37.12	5.91½			
63	Venus . . . N.P.	1.2	14.5	28.0	. .	. .	22 50 27.88	0.21					
64	W. C.	. .	51.7	4.5	18.0	31.5	22 51 4.75	6.21½	36.87	6.00½			
65	Venus . . . N.P.	29.6	43.0	56.4	. .	. .	22 52 56.31	0.16½					
66	W. C.	. .	19.5	33.0	. .	0.2	22 53 33.10	+6.22	—36.79	—6.05½			

OCTOBER 24, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
67	Venus . . . N.P.	44.2	. .	11.2	. .	. .	22 55 11.03	+2.96			28.046	64.4	54.0
68	W. C.	. .	34.0	47.5	0.5	14.0	22 55 47.33	9.00½	—36.31	—6.04½			
69	Venus . . . N.P.	24.8	38 2	51.5	. .	. .	22 0 51.48	2.90			Ther. att. 63°.8 Bar. red. to 32° F. 27.951		
70	W. C.	. .	13.6	26.8	40.2	53.7	23 1 26.90	8.95	35.42	6.05			
71	Venus . . . N.P.	9.5	22.8	36.5	. .	. .	23 2 36.24	2.73½					
72 *d*	W. C.	. .	. .	11.2	. .	38.5	23 3 11.50	+8.81	—35.26	—6.07½			

Remarks.

Considerable haze around the horizon; but the planet and star are both greatly more steady than on any preceding night. The observations, throughout, are as good as it is possible to make them on such an object, and in that position of the instrument.

a Good observations.

b Tremulous.

c Scarcely visible.

d Too dim to observe; recorded 43.5s. at wire E.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean . .	Thirty-six transits . . .	22 9 18.16	— 42.93	— 5.480	= 1 46.81

Correction for chronometer at 22 h. 9 m. . . . — 3 m. 10.63 s. Santiago sid. time N. P. . . . . 22 h. 6 m. 7.53 s.

Δ ρ at 22 h. 6 m. . . . . 0.06″

OCTOBER 25, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	30.6	44.0	57.5	10.8	24 3	21 29 57.44	— 0.76½			27.991	68.0	55.4
2 *a*	W. C.	7.5	. .	31.2	47.4	1.0	21 34 34.18	10.52½	—4 36.74	+9.76			
3	Venus . . . N.P.	57.6	10 6	24.2	37.5	51.0	21 37 24.18	1.99			Ther. att. 68°.0 Bar. red. to 32° F. 27.884		
4	W. C.	33.0	46.5	59.8	13.0	26.5	21 41 59.76	11.56	4 35.58	9.57			
5	Venus . . . N.P.	53.6	7.1	20.5	33.6	47.4	21 45 20.44	2.35					
6 *b*	W. C.	28.2	41.4	54.6	8.0	21.5	21 49 54.74	11.77½	4 34.30	9.42½			
7	Venus . . . N.P.	33.2	46.6	0.0	13.4	26.7	21 51 59.98	2.30					
8	W. C.	6.5	19.6	33.2	46.5	59.8	21 56 33.12	11.70	4 33.14	9.40			
9	Venus . . . N.P.	17.5	30.8	44.3	57.6	11.0	21 58 44.24	2.33½					
10	W. C.	50.0	3.4	16.8	30.0	43.4	22 3 16.72	11.81½	4 32.48	9.48			
11	Venus . . . N.P.	29.5	43.2	56.6	9.6	23.3	22 5 56.44	0.13					
12	W. C.	1.0	14.2	27.6	41.0	54.5	22 10 27.66	9.38½	4 31.22	9.25½			
13	Venus . . . N.P.	1.0	14.3	27.7	40.8	54.4	22 13 27.64	0.61½					
14	W. C.	31.2	44.6	57.7	11.0	24.6	22 17 57.82	—9.71	4 30.12	9.09½			
15	Venus . . . N.P.	58.5	12.0	25.2	38.5	51.6	22 20 25.16	+2.61½					
16	W. C.	27.5	41.0	54.5	7.5	21.0	22 24 54.30	—6.46½	4 29.14	9.08			
17	Venus . . . N.P.	58.5	11.5	25.2	38.5	52.0	22 28 25.14	+5.61½					
18	W. C.	. .	39.9	53.0	6.2	19.6	22 32 52.99	—3.41	—4 27.85	+9.02½			

OCTOBER 25, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
19	Venus . . . N.P.	5.5	19.0	32.3	45.5	59.0	22 35 32.26	+5.65			28.013	60.7	53.8
20	W. C.	32.3	45.8	59.2	12.5	25.8	22 39 59.12	—3.28	—4 26.86	+8.93			
21	Venus . . . N.P.	24.5	37.6	51.2	4.5	18.2	22 41 51.20	+6.02			Ther. att. 64°.5		
22	W. C.	50.5	3.5	17.1	30.3	43.6	22 46 17.00	—2.77½	4 25.80	8.79½	Bar. red. to 32° F.		
23	Venus . . . N.P.	58.5	12.3	25.5	38.8	52.4	22 48 25.50	+5.85			27.917		
24	W. C.	23.5	37.0	50.5	3.5	17.0	22 52 50.30	—2.81½	4 24.80	8.66½			
25	Venus . . . N.P.	27.5	41.0	54.5	7.7	21.0	22 54 54.34	+5.59½					
26	W. C.	51.5	5.3	18.5	31.8	45.0	22 59 18.42	—3.10	4 21.08	8.69½			
27	Venus . . . N.P.	1.5	15.0	28.5	41.8	55.3	23 1 28.42	+5.43½					
28	W. C.	24.6	38.2	51.5	4.6	18.2	23 5 51.42	—3.15	4 23 00	8.58½			
29 *c*	Venus . . . N.P.	15.5	28.8	42.0	55.5	9.0	23 7 42.16	+5.23½					
30	W. C.	37.5	51.0	4.5	17.5	31.0	23 12 4.30	—3.31	4 22.14	8.57½			
31	Venus . . . N.P.	2.5	16.0	29.2	42.8	56.3	23 14 29.33	+5.08					
32	W. C.	23.5	. .	50.5	3.8	17.3	23 18 50.43	—3.32	4 21.07	8.40			
33	Venus . . . N.P.	. .	29.5	42.5	56.0	9.5	23 20 42.69	+4.68					
34 *d*	W. C.	36.0	49.5	3.0	16.0	29.5	23 25 2.80	—3.61	4 20.11	8.29			
35	Venus . . . N.P.	38.2	51.5	5.0	18.5	32.0	23 27 5.01	+4.31½					
36	W. C.	57.5	10.8	24.4	37.5	51.2	23 31 24.28	—3.97	4 19.24	8.28½			
37	Venus . . . N.P.	11.0	24.6	38.2	51.5	4.8	23 33 38.02	+3.76					
38	W. C.	. .	42.5	56.3	9.3	23.0	23 37 56.09	—4.51½	4 18.07	8.27½			
39	Venus . . . N.P.	39.5	53.0	6.4	20.2	33.4	23 40 6.50	+2.62½					
40	W. C.	56.8	10.2	23.5	37.0	50.2	23 44 23.54	—5.49	4 17.01	8.11½			
41	Venus . . . N.P.	0.5	14.0	27.5	40.8	54.5	23 46 27.46	+1.45½					
42	W. C.	16.5	30.1	43.5	57.5	10.5	23 50 43.62	—6.56	—4 16.16	+8.01½			

Remarks.

Night favorable. The star is certainly not of more than the 7th magnitude, and was completely lost in the haze after 23*h.* 50*m.* sid. time. There is evidently an error of 2*m.* in its A. R. Measures generally fair.

a Recorded 57.5*s.* at wire A.

b Rather too close.

c Tremulous—a little open.

d A little close.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . Twenty-one transits . .		22 40 11.60	—4 26.14 . . .	+ 8.844 . . .	= 2 52.37

Correction for chronometer at 22h. 40m. . . . —3m. 12.49s. Santiago sid. time N. P. . . . . 22h. 33m. 59.11s.

Δ ρ at 22h. 55m. . . . . 0″.12

OCTOBER 26, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	33.0	46.2	59.6	26.5	23.5	21 33 59.62	— 1.24			27.960	67.0	56.5
2	W. C.	. .	49.5	3.0	16.3	29.5	21 35 2.89	10.43½	—1 3.27	+9.19½			
3	Venus . . . N.P.	2.5	16.0	29.2	42.5	. .	21 37 29.22	1.18½			Ther. att. 67°.8 Bar. red. to 32° F. 27.854		
4	W. C.	5.5	. .	32.2	45.3	. .	21 38 32.12	10.37	1 2.90	9.18½			
5	Venus . . . N.P.	32.3	45.0	58.8	11.8	. .	21 40 58.64	1.17					
6	W. C.	34.0	47.5	0.5	14.2	. .	21 42 0.72	10.41	1 2.08	9.24			
7	Venus . . . N.P.	6.0	19.4	32.5	46.0	. .	21 44 32.64	1.09½					
8	W. C.	7.6	21.2	34.3	47.6	1.0	21 45 34.34	10.40	1 1.70	9.30½			
9	Venus . . . N.P.	0.2	13.7	27.0	40.3	. .	21 48 26.98	1.05½					
10	W. C.	. .	14.7	28.3	41.2	54.6	21 49 28.02	10.40	1 1.04	9.34½			
11	Venus . . . N.P.	5.7	19.3	32.5	46.0	. .	21 51 32.54	1.05					
12	W. C.	6.8	20.2	33.6	46.8	0.5	21 52 33.58	10.50	1 1.04	9.45			
13	Venus . . . N.P.	7.3	20.5	34.3	47.5	. .	21 54 34.07	1.07½					
14	W. C.	7.5	21.0	34.5	47.8	1.3	21 55 34.42	10.48½	1 0.35	9.41			
15	Venus . . . N.P.	11.5	25.0	38.3	51.5	. .	21 57 38.24	0.99½					
16	W. C.	11.5	25.2	38.5	51.7	5.3	21 58 38.44	10.53½	1 0.20	9.54			
17	Venus . . . N.P.	0.5	14.2	27.6	40.8	. .	22 1 27.41	1.06½					
18	W. C.	. .	13.5	26.5	. .	53.5	22 2 26.69	10.50½	59.25	9.41			
19	Venus . . . N.P.	49.5	2.6	16.3	29.5	. .	22 5 16.14	1.02					
20	W. C.	. .	1.5	15.0	28.0	41.7	22 6 14.87	10.58½	58.73	9.56½			
21	Venus . . . N.P.	42.6	56.0	9.4	22.8	. .	22 8 9.37	1.02					
22	W. C.	41.2	54.6	7.7	21.0	34.5	22 9 7.80	10.56½	58.43	9.54½			
23	Venus . . . N.P.	6.0	19.5	32.8	46.3	. .	22 11 32.82	0.95½					
24	W. C.	. .	17.5	30.7	44.0	57.5	22 12 30.74	10.52	57.92	9.56½			
25 a	Venus . . . N.P.	. .	17.3	30.6	43.5	. .	22 14 30.47	0.90					
26	W. C.	1.2	14.8	28.0	41.5	55.2	22 15 28.14	10.52	57.67	9.62			
27	Venus . . . N.P.	37.3	50.7	4.0	17.5	. .	22 18 4.01	1.18					
28	W. C.	. .	47.6	1.0	14.3	27.6	22 19 0.94	10.81	56.90	9.63			
29	Venus . . . N.P.	17.7	31.0	44.5	57.6	. .	22 21 44.37	0.94½					
30 b	W. C.	. .	27.2	41.0	54.5	8.0	22 22 40.99	10.64½	56.62	9.70			
31	Venus . . . N.P.	37.6	50.5	3.7	17.1	. .	22 25 3.89	0.90½					
32	W. C.	32.5	46.2	59.5	12.8	26.3	22 25 59.46	10.58½	55.57	9.68			
33	Venus . . . N.P.	1.6	15.5	28.8	42.3	. .	22 28 28.72	1.21½					
34	W. C.	. .	11.2	24.5	37.7	51.0	22 29 24.42	11.06½	55.70	9.85			
35	Venus . . . N.P.	30.5	43.5	56.8	10.3	. .	22 31 56.94	1.23½					
36	W. C.	. .	38.5	52.0	5.0	. .	22 32 51.84	11.13	54.90	9.89½			
37	Venus . . . N.P.	12.0	25.5	38.8	52.5	. .	22 35 38.79	1.24½					
38	W. C.	. .	20.0	33.4	47.0	0.0	22 36 33.42	11.12	54.63	9.87½			
39 c	Venus . . . N.P.	20.2	33.5	47.0	0.3	. .	22 42 46.92	1.42½					
40	W. C.	. .	26.6	. .	53.5	6.8	22 43 40.06	11.27½	53.14	9.85			
41	Venus . . . N.P.	52.5	. .	19.5	33.0	. .	22 46 19.47	1.38					
42	W. C.	. .	59.0	12.3	25.5	39.0	22 47 12.27	11.27	52.80	9.89			
43	Venus . . . N.P.	52.0	5.5	19.0	32.3	. .	22 49 18.87	1.31					
44	W. C.	. .	58.2	11.0	24.5	37.8	22 50 11.19	11.33½	52.32	10.02½			
45	Venus . . . N.P.	34.0	47.5	0.8	14.3	. .	22 54 0.82	1.71					
46	W. C.	. .	39.5	52.5	6.6	19.2	22 54 52.77	—11.91	—51.95	+10.20			

OCTOBER 26, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
47	Venus . . . N.P.	28.5	42.3	55.5	8.5	22.4	22 57 55.44	— 1.65			27.962	61.0	53.1
48 d	W. C.	. .	. .	46.8	0.0	. .	22 58 46.74	11.50½	—51.30	+9.85½			
49	Venus . . . N.P.	35.2	. .	1.8	15.3	. .	23 0 1.89	1.53½			Ther. att. 64°.5 Bar. red. to 32° F. 27.866		
50	W. C.	. .	39.4	52.5	6.0	19.5	23 0 52.67	11.70	50.78	10.16½			
51	Venus . . . N.P.	35.3	48.8	2.3	15.5	. .	23 3 2.14	1.52½					
52	W. C.	. .	39.3	52.4	5.5	19.0	23 3 52.36	11.75	50.22	10.22½			
53 c	Venus . . . N.P.	8.5	22.2	35.5	49.0	. .	23 5 35.47	1.41					
54	W. C.	. .	12.0	25.2	38.5	. .	23 6 25.24	—11.61	—49.77	+10.20			

Remarks.

Hazy throughout the evening. Planet well defined, but star dim, and the measures only fair. The difference in A. R., from that given in the Ephemeris, same as last night.

a Recorded 58.6s. at wire A.

b Recorded 41.5s. at wire C.

c Tremulous.

d Cirri.

e Interrupted by clouds.

Results.

		h. m. s.	s.	rev.	′ ″
Mean . .	Twenty-seven transits . .	22 20 0.22	— 56.71	+ 9.683 . . . . =	8.72

Correction for chronometer at 22 20 (h. m.) . . . —3 14.15 (m. s.) Santiago sid. time N. P. . . . . 22 16 46.07 (h. m. s.)

Δ ρ at 22 17 (h. m.) . . . . 0.10 (″)

OCTOBER 27, 1850.

Night overcast.

OCTOBER 28, 1850.

The night was wholly overcast.

OCTOBER 29, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	W. C.	40.3	53.5	7.0	20.2	33.5	21 48 6.90	—13.26½			28.244	52.5	46.0
2	Venus . . . N.P.	13.5	27.0	40.4	53.8	7.0	21 51 40.34	+16.80	+3 33.44	+30.06½			
3	W. C.	19.5	33.0	46.2	59.8	13.0	21 54 46.30	—12.92½			Ther. att. 59°.7 Bar. red. to 32° F. 28.161		
4	Venus . . . N.P.	53.5	7.0	20.5	33.5	47.0	21 58 20.30	+17.27½	3 34.00	30.20			
5	W. C.	21.2	34.6	. .	. .	. .	22 2 47.94	—12.80					
6	Venus . . . N.P.	56.5	10.0	23.5	. .	50.5	22 6 23.45	+17.23½	3 35.51	30.03½			
7 b	W. C.	5.5	19.2	32.5	. .	59.5	23 10 32.50	—13.10					
8	Venus . . . N.P.	50.5	4.0	17.0	30.5	44.5	23 14 17.30	+16.38	3 44.80	29.48			
9	W. C.	22.2	35.5	49.0	2.0	16.0	23 17 48.94	—12.97					
10	Venus . . . N.P.	7.8	21.2	35.0	48.3	1.7	23 21 34.80	+16.52	+3 45.86	+29.49			

OCTOBER 29, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	W. C.	20.5	34 2	47.5	1.0	14.5	23 26 47.54	—11.98			28.244	52.5	46.0
12	Venus . . . N.P.	7.8	21.5	34.7	48.3	1.8	23 30 34.82	+17.41	+3 47.28	+29.39			
13	W. C.	43.6	57.3	10.5	24.0	37.5	23 33 10.58	—11.61			Ther. att. 59°.7		
14	Venus . . . N.P.	32.0	45.5	59.0	12.5	26.0	23 36 59.00	+17.68	+3 48.42	+29.29	Bar. red. to 32° F. 28.161		

Remarks.

Venus appears like an image in a basin of agitated mercury, and is wholly impossible to measure with any degree of accuracy under a power of 150. Efforts were made with lower powers from 22*h*. 6*m*. until 23*h*. 10*m*. sid. time; but it was still found impracticable, a cold SE wind (from the Andes) evidently producing rapid changes in the refraction.

a Recorded 21*h* 47*m*. 6.90*s*. *b* Recorded 23*h*. 9*m*. 32.50*s*.

Wrong star. Evidently the one on the map in A. R. 17*h*. 13*m*. 20*s*. ± Dec. — 27° 32′ ±.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . .	First three transits . . .	21 58 48.03	+3 34.32	+30.100	=9 46.65
Mean . . .	Last four transits . . .	23 25 51.48	+3 46.59	+29.412	=9 33.24

	h. m.	m. s.		h. m. s.
Correction for chronometer at	21 59 . . .	—3 17.87	Santiago sid. time N. P.	21 55 30.16
Correction for chronometer at	23 26 .	—3 17.90	Santiago sid. time N. P.	23 22 33.58

	h. m.	″		h. m.	″
Δ ρ at	21 53	0.24	Δ ρ at	23 31	0.80

OCTOBER 30, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	W. C.	33.5	46.5	59.5	. .	. .	22 27 59.89	—11.74½			28.014	60.5	50.0
2	Venus . . . N.P.	31.0	44.4	57.6	11.1	24.6	22 34 57.74	+ 5.64	+6 57.85	+17.38½			
3	W. C.	47.5	0.8	14.5	27.5	41.0	22 38 14.26	—12.64			Ther. att 62°.2		
4	Venus . . . N.P.	46.5	0.0	13.2	26.5	40.0	22 45 13.24	+ 5.07	6 58.98	17.71	Bar. red. to 32° F. 27.925		
5	W. C.	35.0	47.5	1.5	14.0	28.0	22 48 1.20	—12.51½					
6 *a*	Venus . . . N.P.	35.0	48.5	1.5	15.5	28.8	22 55 1.86	+ 5.10	7 0.66	17.61½			
7	W. C.	. .	49.8	3.3	. .	. .	22 58 3.24	—12.45					
8	Venus . . . N.P.	38.5	52.3	5.5	18.8	32.2	23 5 5.46	+ 5.10	7 2.22	17.55			
9 *b*	W. C.	. .	33.8	47.5	1.0	. .	23 7 47.44	—12.83					
10	Venus . . . N.P.	23.7	37.5	50.6	4.1	17.5	23 14 50.68	— 5.06	+7 3.24	+17.89			

Remarks.

A beautiful night; the planet well defined, steady, and with sharp cusps. The star is very faint, and there are others equally bright nearer the planet.

a A little open. *b* Seen through cirri.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean	Five transits	22 55 1.80	+7 0.59	+17.630	=5 43.61

	h. m.	m. s.		h. m. s.
Correction for chronometer at	22 55 . .	—3 18.44	Santiago sid. time N. P.	22 51 43.36

	h. m.	″
Δ ρ at	22 48	0.23

OCTOBER 31, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. $\Delta \alpha$.	$\Delta \delta$.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Anon	25.2	38.7	52.2	6.0	19.5	21 58 52.32	−1.02			27.998	67.5	57.8
2	Venus . . . N.P.	33.5	47.0	0.5	14.2	27.5	22 8 0.54	+1.18	+9 8.22	+2.20			
3 *a*	Anon	31.5	44.6	58.4	11.5	25.0	22 9 58.20	3.39			Ther. att. [illegible]°.5 Bar. red. to 32° F. 27.893		
4	Venus . . . N.P.	41.0	54.5	8.2	21.8	35.2	22 19 8.14	5.00½	9 9.94	1.61½			
5	Anon	38.7	52.2	5.5	19.0	32.5	22 27 5.58	5.34½					
6	Venus . . . N.P.	50.5	4.0	17.7	31.0	44.5	22 36 17.54	6.89½	9 11.95	1.55			
7	Anon	19.0	32.5	46.0	59.2	12.8	22 38 45.90	5.67½					
8	Venus . . . N.P.	32.2	45.6	59.1	12.7	26.6	22 47 59.24	7.16	9 13.34	1.48½			
9 *b*	Anon	41.5	55.2	8.5	22.5	35.5	22 55 8.64	8.09					
10	Venus . . . N.P.	58.0	11.2	24.5	37.8	51.5	23 4 24.60	9.46½	9 15.96	1.37½			
11	Anon	16.5	30.0	43.5	56.8	10.2	23 8 43.40	8.44					
12 *b*	Venus . . . N.P.	33.6	47.2	0.8	14.3	27.5	23 18 0.68	9.85½	9 17.28	1.41½			
13 *c*	Anon	41.0	54.5	8.0	21.2	34.5	23 20 7.84	8.34			28.012	62.6	56.3
14 *d*	Venus . . . N.P.	59.6	13.5	26.5	40.2	53.8	23 29 26.72	9.64	9 18.88	1.50			
15	Anon	. .	14.5	28.0	41.0	55.0	23 32 27.92	7.97			Ther. att. 65°.5 Bar. red. to 32° F. 27.910		
16	Venus . . . N.P.	21.5	35.0	48.5	2.0	15.5	23 41 48.50	9.18	9 20.58	1.21			
17	Anon	48.2	2.0	15.5	28.8	42.5	23 45 15.40	7.14					
18	Venus . . . N.P.	10.5	24.0	38.0	51.5	5.0	23 54 37.80	+8.25	+9 22.40	+1.12			

Remarks.

Fine night. Planet steady and well-defined. It was subsequently ascertained that the proper comparing star follows the planet, and therefore the observations are not comparable.

a Recorded 22*h*. 10*m*. 58.20*s*.

b Good measures.

c Recorded 33.5*s*. at wire E. Good measures.

d Tremulous.

Results.

Mean . . . Nine transits	h. m. s. 23 2 11.53	m. s. +9 15.40	Rev. +1.474	′ ″ =0 28.73
Correction for chronometer at 23 2 (h. m.) . .	m. s. −3 20.14	Santiago sid. time N. P.		h. m. s. 22 58 51.39
$\Delta \rho$ at 22 54 (h. m.)			″ 0.02	

NOVEMBER 1, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. $\Delta \alpha$.	$\Delta \delta$.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	37.8	51.2	4.5	18.0	31.5	21 49 4.60	+ 5.02½			27.964	73.0	58.5
2	Lacaille . . 7371	15.5	29.0	42.2	55.8	9.4	21 51 42.38	−12.36	−2 37.78	+17.38½			
3 *a*	Venus . . . N.P.	29.3	43.1	56.3	9.8	23.4	21 54 56.38	+ 5.00			Ther. att. 72°.0 Bar. red. to 32° F. 27.845		
4	Lacaille . . 7371	6.5	20.0	33.6	46.9	0.2	21 57 33.44	−12.35½	2 37.06	17.35½			
5 *a*	Venus . . . N.P.	49.8	3.5	16.5	30.3	43.8	22 0 16.78	+ 4.99½					
6 *b*	Lacaille . . 7371	26.0	39.5	53.0	6.5	20.0	22 2 53.00	−12.33	−2 36.22	+17.32½			

NOVEMBER 1, 1850—Continued.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
7 *a*	Venus . . . N.P.	54.7	8.5	21.8	35.0	48.7	22 6 21.74	+ 4.93			27.964	73.0	58.5
8 *c*	Lacaille . . 7371	30.5	43.8	57.5	11.0	24.3	22 8 57.42	—12.32	—2 35.68	+17.25			
9	Venus . . . N.P.	54.0	7.5	21.2	34.5	48.0	22 11 21.04	+ 4.97½			Ther. att. 72°.0 Bar. red. to 32° F. 27.845		
10	Lacaille . . 7371	29.0	42.5	56.0	9.2	22.8	22 13 55.90	—12.26½	2 34.86	17.24			
11	Venus . . . N.P.	52.0	5.5	19.0	32.3	45.9	22 16 18.94	+ 4.98½					
12	Lacaille . . 7371	26.4	39.8	53.4	6.8	20.1	22 18 53.30	—12.25	2 34.36	17.23½			
13	Venus . . . N.P.	50.0	3.7	17.3	30.6	44.0	22 21 17.12	+ 5.04½					
14	Lacaille . . 7371	23.8	37.2	51.0	4.2	17.5	22 23 50.74	—12.20	2 33.62	17.24½			
15	Venus . . . N.P.	51.8	5.8	19.2	32.5	46.0	22 26 19.06	+ 5.00					
16	Lacaille . . 7371	25.0	38.5	52.2	5.5	19.2	22 28 52.08	—12.15½	2 33.02	17.15½			
17	Venus . . . N.P.	9.0	22.5	36.0	49.5	3.0	22 31 36.00	+ 5.33½					
18	Lacaille . . 7371	41.2	54.8	8.2	21.5	35.0	22 34 8.14	—11.85½	2 32.14	17.19			
19	Venus . . . N.P.	26.5	40.0	53.8	6.8	20.5	22 36 53.52	+ 5.25½					
20	Lacaille . . 7371	58.0	11.5	24.6	38.7	52.0	22 39 24.96	—11.88½	2 31.44	17.14			
21	Venus . . . N.P.	1.3	14.6	28.0	41.6	55.2	22 43 28.14	+ 5.27½					
22	Lacaille . . 7371	31.8	45.2	58.6	12.4	25.8	22 45 58.76	—11.76	2 30.62	17.03½			
23	Venus . . . N.P.	49.5	3.0	16.5	30.0	43.6	22 48 16.52	+ 5.58					
24	Lacaille . . 7371	19.6	33.2	46.8	0.0	13.5	22 50 46.62	—11.57	2 30.10	17.15			
25	Venus . . . N.P.	39.7	53.4	7.1	20.3	33.9	22 53 6.88	+ 5.62½					
26	Lacaille . . 7371	9.4	22.9	36.2	49.5	3.2	22 55 36.24	—11.38	2 29.36	17.00½			
27 *d*	Venus . . . N.P.	35.5	48.8	2.2	15.8	29.5	22 58 2.36	+ 5.72					
28	Lacaille . . 7371	4.0	17.9	21.3	44.8	58.2	23 0 31.24	—11.30	2 28.88	17.02			
29 *d*	Venus . . . N.P.	26.2	40.0	53.5	6.8	20.5	23 2 53.40	+ 5.64					
30	Lacaille . . 7371	54.5	8.0	21.5	35.0	48.6	23 5 21.52	—11.33	2 28.12	16.97			
31 *e*	Venus . . . N.P.	8.0	21.5	35.2	48.3	2.0	23 7 35.00	+ 5.69					
32	Lacaille . . 7371	. .	49.0	2.5	16.0	29.5	23 10 2.53	—11.35	2 27.53	17.04			
33	Venus . . . N P.	56.0	9.5	23.0	36.3	50.0	23 12 22.96	+ 5.81					
34	Lacaille . . 7371	23.0	36.2	49.5	3.0	16.6	23 14 49.66	—11.20	2 26.70	17.01			
35	Venus . . . N.P.	53.3	7.0	20.5	34.0	47.5	23 17 20.46	+ 5.73					
36	Lacaille . . 7371	19.5	33.0	46.5	0.2	14.0	23 19 46.64	—11.22	2 26.18	16.95			
37	Venus . . . N.P.	38.5	52.3	5.5	19.0	32.6	23 23 5.58	+ 5.74					
38	Lacaille . . 7371	4.5	17.8	31.2	44.8	58.3	23 25 31.32	—11.19	2 25.74	16.93			
39 *f*	Venus . . . N.P.	8.0	21.5	34.7	48.2	1.7	23 27 34.82	+ 5.72			27.990	63.0	51.8
40	Lacaille . . 7371	32.8	46.3	59.6	13.4	26.8	23 29 59.78	—11.19½	2 24.96	16.91½			
41	Venus . . . N.P.	48.0	1.5	15.0	28.5	42.0	23 33 15.00	+ 5.50½			Ther. att. 67°.0 Bar. red. to 32° F. 27.886		
42	Lacaille . . 7371	12.2	25.8	39.4	52.6	6.4	23 35 39.28	—11.40	2 24.28	16.90½			
43 *d*	Venus . . . N.P.	28.2	41.8	55.5	8.5	22.5	23 37 55.30	+ 5.34					
44	Lacaille . . 7371	51.5	5.5	18.5	32.3	46.0	23 40 18.76	—11.53½	—2 23.46	+16.87½			

Remarks.

Neither planet nor star well defined at any period of the observations. The day has been extremely warm, and a cold wind set in from the Andes immediately after sunset. The star is certainly of 6.7 magnitude.

a A little tremulous.
b Recorded 5.0*s*. at wire C.
c Recorded 23.3*s*. at wire E.
d Very tremulous.
e Very tremulous and much blurred.
f Good.

NOVEMBER 1, 1850—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean .	Twenty-two transits . . .	22 44 30.96	—2 30.55	+17.106	=5 33.40

Correction for chronometer at 22h 44m . . —3m 22s.48 Santiago sid. time N. P. 22h 41m 8s.48

$\Delta\rho$ at 22h 42m . . . . 0″.19

NOVEMBER 2, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Lacaille . . 7371	5.2	18.5	32.0	. .	. .	22 19 31.97	+10.35			28.048	62.8	50.9
2	Venus . . . N.P.	. .	50.5	4.0	17.5	31.4	22 20 4.14	0.70	+32.17	—9.65			
3	Lacaille . . 7371	17.1	30.5	. .	. .	. .	22 23 43.91	10.53			Ther. att 65°.5 Bar. red. to 32° F. 27.949		
4	Venus . . . N.P.	. .	3.0	16.5	29.5	43.5	22 24 16.41	0.54	32.50	9.99			
5	Lacaille . . 7371	20.7	34.2	. .	. .	. .	22 26 47.56	13.90					
6	Venus . . . N.P.	. .	7.2	20.5	34.2	47.8	22 27 20.71	3.88	33.15	10.02			
7	Lacaille . . 7371	51.0	4.5	. .	. .	. .	22 30 17.86	13.75					
8	Venus . . . N.P.	. .	37.6	51.2	4.5	18.5	22 30 51.24	3.80	33.38	9.95			
9	Lacaille . . 7371	18.8	32.5	46.0	. .	. .	22 32 45.83	13.82					
10	Venus . . . N.P.	. .	6.2	19.5	33.0	46.7	22 33 19.64	3.86	33.81	9.96			
11	Lacaille . . 7371	47.5	1.0	14.5	. .	. .	22 35 14.40	13.84					
12	Venus . . . N.P.	. .	34.5	48.0	1.5	15.6	22 35 48.19	3.83	33.79	10.01			
13 *a*	Lacaille . . 7371	17.7	31.2	44.7	. .	. .	22 37 44.60	13.73½					
14	Venus . . . N.P.	. .	5.5	19.1	32.5	46.2	22 38 19.11	3.80	34.51	9.93½			
15	Lacaille . . 7371	46.3	59.7	13.0	. .	. .	22 40 13.07	13.73					
16	Venus . . . N.P.	. .	34.8	48.0	1.5	15.0	22 40 48.11	3.84½	35.04	9.88½			
17 *b*	Lacaille . . 7371	15.6	29.0	42.5	. .	. .	22 42 42.43	13.69					
18	Venus . . . N.P.	. .	4.5	17.8	31.0	44.6	22 43 17.76	3.85	35.33	9.84			
19	Lacaille . . 7371	16.8	30.4	43.8	. .	. .	22 45 43.73	13.75½					
20	Venus . . . N.P.	. .	6.5	19.5	32.8	46.5	22 46 19.61	3.83½	35.88	9.92			
21	Lacaille . . 7371	14.8	28.1	41.5	. .	. .	22 48 41.53	13.63					
22	Venus . . . N P.	. .	3.8	17.2	30.8	44.3	22 49 17.31	3.72½	35.78	9.90½			
23 *c*	Lacaille . . 7371	43.5	57.0	10.3	. .	. .	22 51 10.33	13.61					
24	Venus . . . N.P.	. .	33.0	46.5	0.0	13.5	22 51 46.54	3.68	36.21	9.93			
25	Lacaille . . 7371	26.2	39.6	53.0	. .	. .	22 53 53.00	13.59					
26	Venus . . . N.P.	. .	16.0	29.5	43.0	56.5	22 54 29.54	3.73	36.54	9.86			
27	Lacaille . . 7371	9.0	22.5	36.0	. .	. .	22 56 35.90	13.56½					
28	Venus . . . N.P.	. .	59.2	12.7	26.0	39.7	22 57 12.69	3.60	36.79	9.96½			
29	Lacaille . . 7371	31.4	44.8	58.1	. .	. .	22 59 58.17	13.49½					
30	Venus . . . N.P.	. .	22.6	35.5	48.8	2.5	23 0 35.64	3.61	37.47	9.88½			
31	Lacaille . . 7371	7.5	20.8	34.5	. .	. .	23 2 34.33	13.46½					
32	Venus . . . N.P.	. .	58.5	12.0	25.5	39.1	23 3 12.06	3.63	37.73	9.83½			
33	Lacaille . . 7371	41.0	54.3	7.8	. .	. .	23 5 7.77	13.49					
34	Venus . . . N.P.	. .	32.1	45.7	59.0	12.8	23 5 45.69	3.63	37.92	9.86			
35	Lacaille . . 7371	15.1	28.5	42.0	. .	. .	23 7 41.93	13.39					
36	Venus . . . N.P.	. .	6.6	20.3	33.6	47.5	23 8 20.29	+3.54½	+38.36	—9.84½			

NOVEMBER 2, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
37	Lacaille . . 7371	2.0	15.3	29.0	. .	. .	23 10 28.83	+13.47½			28.048	62.8	50.9
38	Venus . . . N.P.	. .	54.5	7.8	21.0	34.5	23 11 7.74	3.55	+38.91	—9.92½			
39	Lacaille . . 7371	39.2	52.6	6.0	. .	. .	23 13 6.00	13.36			Ther. att. 65°.5 Bar red. to 32° F. 27.949		
40	Venus . . . N.P.	. .	32.1	45.0	58.5	12.1	23 13 45.21	3.58	39.21	9.78			
41	Lacaille . . 7371	9.5	23.1	36.6	. .	. .	23 15 36.47	13.43					
42	Venus . . . N.P.	. .	3.1	16.0	29.5	43.2	23 16 16.24	3.60	39.77	9.83			
43	Lacaille . . 7371	42.5	55.8	9.3	. .	. .	23 18 9.27	13.33½					
44	Venus . . . N.P.	. .	35.5	48.8	2.4	16.0	23 18 48.96	3.55½	39.69	9.78			
45	Lacaille . . 7371	26.5	39.8	53.5	. .	. .	23 20 53.33	13.39					
46	Venus . . . N.P.	. .	20.0	33.0	46.6	0.2	23 21 33.24	3.56	39.91	9.83			
47	Lacaille . . 7371	2.5	16.0	29.5	. .	. .	23 23 29.40	13.35					
48	Venus . . . N.P.	. .	56.5	9.6	23.2	36.8	23 24 9.81	3.53	40.41	9.82			
49	Lacaille . . 7371	38.0	51.5	4.5	. .	. .	23 26 4.73	13.42½					
50	Venus . . . N.P.	. .	32.0	45.5	59.1	12.6	23 26 45.59	3.57½	40.86	9.85			
51	Lacaille . . 7371	24.0	37.2	50.6	. .	. .	23 28 50.67	13.35					
52	Venus . . . N.P.	. .	18.5	31.8	45.3	58.8	23 29 31.89	3.49	41.22	9.86			
53	Lacaille . . 7371	57.5	11.0	24.5	. .	. .	23 31 24.40	13.38½					
54	Venus . . . N.P.	38.5	52.5	6.0	19.5	33.2	23 32 5.94	3.58	41.54	9.80½			
55	Lacaille . . 7371	49.7	3.5	16.8	. .	. .	23 34 16.73	13.52					
56	Venus . . . N.P.	31.2	44.5	58.5	12.0	25.5	23 34 58.34	3.74	41.61	9.78			
57	Lacaille . . 7371	20.5	33.8	47.4	. .	. .	23 36 47.50	13.57			28.072	53.0	47.6
58	Venus . . . N.P.	2.0	15.5	29.4	43.0	56.5	23 37 29.28	3.77	41.98	9.80			
59	Lacaille . . 7371	2.6	16.0	29.5	. .	. .	23 39 29.43	13.59			Ther. att. 62°.0 Bar. red. to 32° F. 27.983		
60	Venus . . . N.P.	. .	58.5	11.6	25.3	38.7	23 40 11.81	3.83½	42.38	9.75½			
61	Lacaille . . 7371	50.5	3.5	17.5	. .	. .	23 42 17.23	13.69½					
62	Venus . . . N.P.	32.6	47.0	0.5	14.0	27.5	23 43 0.32	+ 3.90	+43.09	—9.79½			

Remarks.

After the third differential the cirri passed away, and both planet and star were well defined and steady until the last measures. The first observation was made through clouds, and is not reliable; the others are generally very fair.

a Clear. *b* Beautiful. *c* A little open.

Results.

Mean . . . Thirty-one transits . . 23 2 36.10 (h. m. s.) + 37.64 (s.) . . . . —9.866 (Rev.) . . . . . . = 3 12.29 (′ ″)

Correction for chronometer at 23 3 (h. m.) . . — 3 24.82 (m. s.) Santiago sid. time N. P. . . . . 22 59 11.28 (h. m. s.)

Δ ρ at 22 59 (h. m.) . . . . 0.13 (″)

NOVEMBER 3, 1850.

Cloudy.

NOVEMBER 4, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Lacaille . . 7371	4.5	18.2	31.5	45.0	58.5	21 53 31.54	—7.76½			28.026	64.0	54.3
2	Venus . . . N.P.	31.0	44.5	57.8	11.4	25.0	21 59 57.94	7.53½	+6 26.40	+0.23			
3	Lacaille . . 7371	57.2	10.8	24.2	37.6	51.0	22 4 24.16	8.39			Ther. att. 64°.1 Bar. red. to 32° F. 27.931		
4	Venus . . . N.P.	24.6	38.2	51.7	5.2	18.6	22 10 51.66	8.15½	6 27.50	0.23½			
5	Lacaille . . 7371	59.4	13.2	26.8	39.9	53.0	22 13 26.46	8.02					
6 *a*	Venus . . . N.P.	27.5	41.0	54.9	8.0	21.6	22 19 54.70	7.80½	6 28.24	0.21½			
7	Lacaille . . 7371	21.3	37.5	51.2	4.7	18.3	22 21 51.20	7.87½					
8	Venus . . . N.P.	54.0	7.5	21.0	34.2	47.6	22 28 20.80	7.64	6 29.60	0.23½			
9	Lacaille . . 7371	56.7	10.5	23.5	37.3	51.0	22 30 23.80	7.79					
10	Venus . . . N P.	27.5	41.0	54.7	8.0	21.5	22 36 54.54	7.55	6 30.74	0.24			
11	Lacaille . . 7371	15.5	28.5	42.0	55.5	9.1	22 38 42.14	7.77					
12 *b*	Venus . . . N.P.	47.0	0.3	13.8	27.0	40.7	22 45 13.76	7.52½	6 31.62	0.24½			
13 *c*	Lacaille . . 7371	47.5	0.6	14.0	27.5	41.3	22 47 14.18	7.73½			28.040	53.0	49.1
14	Venus . . . N.P.	19.8	33.5	46.7	0.2	13.6	22 53 46.76	7.43½	6 32.58	0.30			
15	Lacaille . . 7371	3.5	17.0	30.5	44.0	57.5	22 58 30.50	7.89½			Ther. att. 60°.0 Bar. red. to 32° F. 27.957		
16 *d*	Venus . . . N.P.	37.5	50.5	4.4	17.8	31.5	23 5 4.34	7.59½	6 33 84	0.30			
17	Lacaille . . 7371	51.5	5.0	18.6	31.9	45.4	23 7 18.48	7.85					
18 *e*	Venus . . . N.P.	26.5	39.8	53.2	6.5	20.2	23 13 53.24	—7.65	+6 34.76	+0.20			

Remarks.

Night clear. The planet being flaring and unsteady, put on the cap with an aperture of 4 inches. This permitted the first six measures to be made very well.

a A little blurred.
b Blurred and tremulous.
c Both objects blurred and tremulous.
d Very difficult to observe.
e Too tremulous.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean	Nine transits	22 37 6.42	+6 30.59	+0.244	=0 4.76

Correction for chronometer at 22 37 h. m. . . — 3 29.08 m. s.

Santiago sid. time N. P. . . . . 22 33 37.34 h. m. s.

Δ ρ at 22 30 h. m. . . . . 0.00 ″

NOVEMBER 5, 1850.

Cloudy.

NOVEMBER 6, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	53.0	6.5	19.5	33.5	47.0	22 6 19.90	— 3.36			28.006	59.7	53.0
2	W. C.	58.0	12.5	26.0	39.2	52.8	22 9 25.80	12.34½	—3 5.90	+8.98½	Ther. att. 68°.9 Bar. red. to 32° F. 27.896		
3	Venus . . . N.P.	9.2	22.5	36.0	49.5	2.8	22 12 36.00	4.03					
4	W. C.	14.0	27.5	41.0	54.5	7.2	22 15 40.84	—12.92½	—3 4.84	+8.89½			

NOVEMBER 6, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
5	Venus . . . N.P.	46.0	58 7	13.1	26.4	40.3	22 22 12.94	—3.13½			28.005	54.5	50.9
6	W. C.	50.5	. .	16.5	30.0	44.0	22 25 16.89	12.01	—3 3.95	+8.87½			
7	Venus . . . N.P.	39.7	52.5	6.2	19.8	33.3	22 28 6.30	2.94½			Ther. att. 62°.0		
8	W. C.	43.0	. .	9.5	23.2	36.7	22 31 9.74	11.89	3 3.44	8.94½	Bar. red. to 32° F. 27.916		
9	Venus . . . N.P.	54.5	8.2	21.8	35.2	48.8	22 34 21.70	2.88					
10	W. C.	57.5	11.0	24.3	37.8	51.5	22 37 24.42	11.82	3 2.72	8.94			
11	Venus . . . N.P.	23.3	37.0	50.5	3.5	17.5	22 39 50.36	2.69					
12	W. C.	25.5	39.0	52.5	6.0	19.5	22 42 52.50	11.63	3 2.14	8.94			
13	Venus . . . N.P.	15.5	29.8	42.5	56.0	9.7	22 46 42.70	2.60					
14	W. C.	17.1	30.6	44.0	57.0	10.8	22 49 43.90	11.60½	3 1.20	9.00½			
15	Venus . . . N.P.	49.5	3.0	16.5	29.9	43.5	22 53 16.48	2.44					
16	W. C.	50.0	3.5	16.8	30.2	43.8	22 56 16.86	11.34	3 0.38	8.90			
17	Venus . . . N.P.	55.5	8.6	22.0	35.5	49.5	22 58 22.22	2.29½					
18	W. C.	55.5	8.5	22.2	35.5	49.0	23 1 22.14	11.29	2 59.92	8.99½			
19	Venus . . . N.P.	11.5	25.0	38.8	52.1	5.8	23 3 38.64	2.24					
20 *a*	W. C.	11.2	24.6	38.0	51.5	5.0	23 6 38.06	11.23½	2 59.42	8.99½			
21	Venus . . . N.P.	15.0	28.5	42.0	55.5	9.0	23 8 42.00	2.11					
22	W. C.	14.5	27.5	41.0	54.6	8.0	23 11 41.12	11.06	2 59.12	8.95			
23	Venus . . . N.P.	2.0	15.7	29.0	42.5	56.0	23 14 29.04	3.19					
24	W. C	0.5	13.7	27.0	40.5	54.0	23 17 27.14	12.18	2 58.10	8.99			
25	Venus . . . N.P.	1.5	15.5	28.5	42.3	55.5	23 19 28.66	3.20					
26	W. C.	59.3	. .	26.2	39.7	53.3	23 22 26.26	12.25	2 57.60	9.05			
27	Venus . . . N.P.	10.5	24.2	37.5	51.2	4.5	23 24 37.58	3.13					
28	W. C.	7.8	21.0	34.6	48.0	1.5	23 27 34.58	12.11	2 57.00	8.98			
29	Venus . . . N.P.	9 0	22.5	35.8	49.5	3.2	23 29 36.00	3.14½					
30	W. C.	5.5	19.0	32.3	45.9	59.5	23 32 32.44	12.23	2 56.44	9.08½			
31	Venus . . . N.P.	22.2	35.6	49.2	2.6	16.0	23 34 49.12	3.15½					
32	W. C.	18.2	31.5	45.0	58.5	12.0	23 37 45.04	12.15	2 55.92	8.99½			
33 *b*	Venus . . . N.P.	17.2	30.5	44.3	57.8	11.5	23 39 44.26	3.11					
34	W. C.	12.8	26.2	39.5	53.0	6.5	23 42 39.60	12.14	2 55.34	9.03			
35 *b*	Venus . . . N.P.	1.5	15.2	28.5	42.0	56.0	23 45 28.64	3.58					
36	W. C.	56.5	9.6	23.5	36.5	50.5	33 48 23.32	12.59	2 54.68	9.01			
37 *b*	Venus . . . N.P.	24.3	37.5	51.3	4.8	18.5	23 50 51.28	2.60					
38	W. C.	18.5	32.0	45.5	59.0	12.6	23 53 45.52	—11.57	—2 54.24	+8.97			

Remarks.

The night has been extremely favorable—a clear atmosphere without wind. Both objects exceedingly sharp and steady. The first two measures were made by daylight, and the first sixteen were considered very good.

a Recorded 12.2*s*. at wire A. *b* Tremulous.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean . . . Nineteen transits . . .	23 1 44.89	—2 59.59	+8.976	=2 54.94

Correction for chronometer at 23h 2m . . . —3m 33s.10

Santiago sid. time N. P. 22h 58m 11s.79

Δ ρ at 23h 0m . . . . 0″.07

NOVEMBER 7, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	. .	24.2	. .	. .	4.7	22 34 37.71	±0.[illegible]			28.063	60.8	53.4
2	W. C.	. .	47.5	. .	. .	27.5	22 35 0.75	−9.65½	−23.04	+9.65½			
3	Venus . . . N.P.	31.0	44.8	. .	. .	25.0	22 37 58.04	±0.00			Ther. att. 61°.5		
4	W. C.	54.5	7.5	. .	34.5	48.0	22 38 21.07	−9.65½	23.03	9.65½	Bar. red. to 32° F. 27.975		
5	Venus . . . N.P.	18.5	32.0	. .	. .	12.6	22 41 45.48	±0.00					
6	W. C.	41.5	54.6	. .	21.5	34.5	22 42 7.95	−9.65½	22.47	9.65½			
7	Venus . . . N.P.	18.2	31.5	. .	. .	12.2	22 44 45.03	±0.00					
8	W. C.	40.7	54.2	. .	20.6	34.0	22 45 7.32	−9.60½	22.24	9.60½			
9	Venus . . . N.P.	43.6	57.0	. .	. .	37.5	22 47 10.48	±0.00					
10	W. C.	. .	19.2	. .	46.0	59.2	22 47 32.51	−9.60½	22.03	9.60½			
11	Venus . . . N.P.	57.0	10.5	. .	. .	51.2	22 55 24.01	±0.00					
12	W. C.	18.5	31.8	. .	. .	11.9	22 55 45.18	−9.60½	21.17	9.60½			
13	Venus . . . N.P.	41.2	54.6	. .	. .	35.2	22 58 8.11	±0.00					
14	W. C.	. .	15.6	. .	. .	55.6	22 58 28.85	−9.64	20.74	9.64			
15	Venus . . . N.P.	3.5	17.5	. .	. .	58.0	23 1 30.78	±0.00					
16	W. C.	24.5	38.0	51.5	. .	18.3	23 1 51.40	−9.65	20.62	9.65			
17	Venus . . . N.P.	0.5	14.5	27.5	41.5	55.0	23 4 27.80	±0.00					
18	W. C.	. .	. .	. .	1.5	14.5	23 4 47.86	−9.65	20.06	9.65			
19	Venus . . . N.P.	52.0	5.0	. .	. .	46.0	23 9 18.77	±0.00					
20	W. C.	. .	25.5	. .	. .	5.5	23 9 38.75	−9.65	19.98	9.65			
21	Venus . . . N.P.	25.0	38.8	52.2	. .	. .	23 11 52.08	±0.00					
22	W. C.	. .	. .	11.5	25.0	37.5	23 12 11.24	−9.62½	19.16	9.62½			
23	Venus . . . N.P.	43.5	57.0	10.5	. .	. .	23 16 10.41	±0.00					
24	W. C.	. .	. .	29.5	43.0	56.4	23 16 29.54	−9.64½	19.13	9.64½			
25	Venus . . . N.P.	50.7	4.3	17.5	. .	. .	23 18 17.58	±0.00					
26	W. C.	. .	. .	36.5	49.8	3.2	23 18 36.40	−9.64½	18.82	9.64½			
27 a	Venus . . . N.P.	56.5	9.6	22.8	. .	. .	23 20 23.04	±0.00					
28	W. C.	. .	. .	41.5	55.5	9.2	23 20 41.97	−9.68	18.93	9.68			
29	Venus . . . N.P.	14.0	27.5	40.8	. .	. .	23 22 40.84	±0.00			28.000	57.0	51.2
30	W. C.	. .	. .	59.8	12.8	26.0	23 22 59.44	−9.68	18.60	9.68			
31	Venus . . . N.P.	49.6	3.6	16.8	. .	. .	23 25 16.61	±0.00			Ther. att. 62°.5		
32	W. C.	. .	. .	34.8	48.0	1.8	23 25 34.77	−9.68	18.16	9.68	Bar. red. to 32° F. 27.909		
33	Venus . . . N.P.	6.5	20.1	33.5	. .	. .	23 27 33.44	±0.00					
34 b	W. C.	. .	. .	50.8	4.5	18.2	23 27 51.07	−9.68	−17.63	+9.68			

Remarks.

At no time during the observations was the planet free from tremor; and the necessity of measuring it on the fixed wire (because of the small difference in A. R.) rendered the observations somewhat uncertain: the measures are, therefore, considered only fair.

a Recorded 23.8s. at wire C. *b* Recorded 51.8s. at wire C.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean . . Seventeen transits . . .		23 3 22.37	−20.34	+9.647 . . .	=3 8.02
	h. m.	m. s.			h. m. s.
Correction for chronometer at	23 3	−3 35.32	Santiago sid. time N. P.		22 59 47.05

h. m. ″

$\Delta\rho$ at 23 0 . . . . 0.11

NOVEMBER 8, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	W. C.	24.5	38.0	51.7	5.3	18.5	22 18 51.60	−14.74			27.978	65.2	55.4
2	Venus . . . N.P.	33.2	46.5	0.0	13.5	27.0	22 21 0.01	3.22	+2 8.44	+11.52			
3	W. C.	29.8	43.0	56.5	9.8	23.5	22 23 56.52	14.67			Ther. att. 62.°0 Bar. red. to 32° F. 27.889		
4	Venus . . . N.P.	38.2	51.9	5.4	18.6	32.5	22 26 5.32	3.13½	2 8.80	11.53½			
5	W. C.	20.5	33.8	47.0	0.5	14.3	22 30 47.22	14.46½					
6	Venus . . . N P.	29.8	43.5	57.0	10.2	23.9	22 32 56.88	2.84½	2 9.66	11.62			
7	W. C.	51.0	4.5	17.8	31.0	44.6	22 35 17.78	14.37					
8 *a*	Venus . . . N.P.	0.8	14.5	27.8	41.0	54.6	22 37 27.74	2.83	2 9.96	11.54			
9	W. C.	40.5	54.3	7.5	21.0	34.5	22 40 7.56	14.28					
10	Venus . . . N.P.	51.5	5.0	18.5	31.8	45.6	22 42 18.48	2.68	2 10.92	11.60			
11	W. C.	11.8	25.2	38.5	52.0	5.5	22 44 38.60	14.22½					
12	Venus . . . N.P.	22.5	36.5	49.8	3.0	16.8	22 46 49.72	2.62	2 11.12	11.60½			
13	W. C.	34.8	48.1	1.4	14.8	28.5	22 49 1.52	14.10½					
14	Venus . . . N.P.	46.2	59.5	13.3	26.8	40.3	22 51 13.22	2.54	2 11.70	11.56½			
15	W. C.	5.5	19.0	32.3	46.0	59.5	22 53 32.46	14.10					
16	Venus . . . N.P.	17.7	30.7	44.5	57.5	11.5	22 55 44.38	2.44	2 11.92	11.66			
17	W. C.	7.5	20.8	34.4	47.5	1.4	22 58 34.32	14.05					
18	Venus . . . N.P.	20.0	33.4	46.8	0.5	14.0	23 0 46.94	2.29	2 12.62	11.76			
19	W. C.	30.2	43.6	56.8	10.5	24.0	23 2 57.02	13.98					
20	Venus . . . N.P.	43.2	56.5	10.1	23.5	37.1	23 5 10.08	2.28	2 13.06	11.70			
21	W. C.	51.1	4.5	17.6	31.2	44.6	23 7 17.80	13.94½					
22	Venus . . . N.P.	4.5	17.8	31.5	45.0	58.4	23 9 31.44	2.23½	2 13.64	11.71			
23	W. C.	10.6	24.0	37.3	51.0	4.5	23 11 37.48	13.83					
24	Venus . . . N.P.	24.3	37.5	51.4	4.5	18.5	23 13 51.24	2.07	2 13.76	11.76			
25	W. C.	43.0	56.5	9.5	23.1	36.8	23 16 9.78	13.72½					
26	Venus . . . N.P.	57.3	10.8	24.0	37.5	51.5	23 18 24.22	2.00	2 14.44	11.72½			
27	W. C.	18.0	31.5	44.6	58.2	12.0	23 20 44.86	13.70½					
28	Venus . . . N.P.	32.7	46.5	59.7	13.3	27.0	23 22 59.84	1.96½	2 14.98	11.74			
29	W. C.	18.5	31.8	45.0	58.3	12.1	23 25 45.14	13.69					
30	Venus . . . N.P.	33.5	47.1	0.5	14.0	27.5	23 28 0.52	1.90	2 15.38	11.79			
31	W. C.	30.8	44.5	57.7	11.2	24.0	23 30 57.64	13.69			27.990	56.5	50.9
32	Venus . . . N.P.	46.8	0.5	13.5	27.5	40.5	23 33 13.76	1.88	2 16.12	11.81			
33 *b*	W. C.	. .	59.6	13.0	. .	39.8	23 35 12.97	13.61			Ther. att. 61°.5 Bar. red. to 32° F. 27.902		
34	Venus . . . N.P.	2.2	15.5	29.4	42.5	56.4	23 37 29.20	1.74½	2 16.23	11.86½			
35	W. C.	22.5	36.2	49.5	3.2	16.8	23 42 49.64	13.62½					
36	Venus . . . N.P.	40.0	53.5	6.5	20.3	34.0	23 45 6.86	−1.73	+2 17.22	+11.89½			

Remarks.

A clear and favorable night until interrupted by cirrus clouds about the planet. Measures all very fair.

a Somewhat blurred. *b* Clouds.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean . . Eighteen transits	23 2 40.55	+2 12.78	+11.683 . . .	=3 47.72

Correction for chronometer at 23 h. 3 m. . . . −3 m. 36.61 s. Santiago sid. time N. P. . . . . 22 h. 59 m. 3.94 s.

Δ ρ at 22 h. 58 m. . . . . 0.12″

NOVEMBER 9, 1850.

Cloudy.

NOVEMBER 10, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	40.7	54.1	7.6	20.8	34.5	22 32 7.54	—7.07½			28.114	62.0	53.8
2	W. C.	. .	29.2	42.5	55.8	9.5	22 33 42.51	+0.38	—1 35.00	—7.45½	Ther. att. 61°.8 Bar. red. to 32° F. 28.025		

Remarks.

Clouds prevented further observation. These measures were made by daylight, and are good.

Results.

Mean . . One transit	h. m. s. 22 32 7.54	m. s. —1 35.00	Rev. —7.455 . . . . =2 25.29 (′ ″)
Correction for chronometer at 22 32 (h. s.) . . .	m. s. —3 40.14	Santiago sid. time N. P.	h. m. s. 22 28 27.40
Δ ρ at 22 29 (h. m.)	″ 0.06		

NOVEMBER 11, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	W. C.	43.8	57.5	11.0	. .	37.5	22 37 10.78	—8.76			28.032	62.5	53.0
2	Venus . . . N.P.	. .	. .	49.5	3.2	16.8	22 37 49.76	9.70	+38.98	—0.94			
3	W. C.	52.0	5.5	19.0	. .	. .	22 40 18.89	8.66½			Ther. att. 64°.0 Bar. red. to 32° F. 27.937		
4	Venus . . . N.P.	. .	44.8	58.2	11.5	25.0	22 40 58.16	9.60½	39.27	0.94			
5	W. C.	9.8	23.0	37.0	. .	. .	22 51 36.66	9.02½					
6	Venus . . . N.P.	. .	3.5	17.3	30.5	44.0	22 52 17.11	9.84	40.45	0.81½			
7	W. C.	56.0	9.9	22.0	. .	. .	22 54 23.02	9.00½					
8	Venus . . . N P.	36.5	49.8	3.5	17.0	30.5	22 55 03.46	9.85	40.44	0.84½			
9	W. C.	5.0	18.5	31.7	. .	. .	22 57 31.79	9.02½					
10	Venus . . . N.P.	. .	59.5	13.0	26.4	39.6	22 58 12.91	9.81	41.12	0.78½			
11	W. C.	. .	48.8	2.4	. .	. .	23 2 2.29	8.95					
12	Venus . . . N.P.	. .	30.3	43.6	57.0	10.5	23 2 43.64	9.79	41.35	0.84			
13 a	W. C.	40.3	53.6	7.2	. .	. .	23 5 7.09	9.10					
14	Venus . . . N.P.	22.0	35.5	48.8	2.3	15.8	23 5 48.88	9.91	41.79	0.81			
15 a	W. C.	21.2	34.6	47.8	. .	15.0	23 7 47.98	9.16					
16	Venus . . . N.P.	. .	16.8	30.0	43.0	56.8	23 8 29.94	9.88	41.96	0.72			
17 a	W. C.	16.0	29.5	43.3	. .	10.0	23 10 43.03	9.11					
18	Venus . . . N.P.	58.3	11.8	25.2	38.5	52.3	23 11 25.22	9.80	42.19	0.69			
19 a	W. C.	54.0	7.5	21.0	. .	. .	23 13 20.89	9.06					
20	Venus . . . N.P.	36.5	50.0	3.5	16.8	30.3	23 14 3.42	—9.78	+42.53	—0.72			

NOVEMBER 11, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
21 *a*	W. C.	1.0	14.5	27.8	. .	55.0	23 16 27.90	—9.00½			28.042	55.6	50.0
22	Venus . . . N.P.	. .	57.2	10.5	24.0	37.5	23 17 10.59	9.71	+42.69	—0.70½			
23 *a*	W. C.	40.5	53.8	7.7	. .	34.2	23 19 7.38	8.98			Ther. att. 61°.5 Bar. red. to 32° F. 27.954		
24	Venus . . . N P.	23.4	36.8	50.3	3.5	17.2	23 19 50.24	9.65½	42.86	0.67½			
25 *a*	W. C.	21.2	34.6	48.0	. .	15.2	23 21 48.08	8.90					
26	Venus . . . N.P.	4.2	18.0	31.2	44.5	58.1	23 22 31.20	9.55	43.12	0.65			
27 *a*	W. C.	4.0	18.0	31.5	. .	58.5	23 24 31.33	8.85					
28	Venus . . . N.P.	48.0	1.5	15.0	28.2	41.8	23 25 14.90	9.50	42.57	0.65			
29	W. C.	47.9	1.4	15.0	. .	41.8	23 27 14.85	8.88½					
30	Venus . . . N.P.	31.5	45.0	58.5	11.8	25.4	23 27 58.44	9.44	43.59	0.55½			
31	W. C.	23.0	36.5	50.0	. .	17.0	23 29 49.95	8.79½					
32	Venus . . . N.P.	6.8	20.0	33.5	47 0	0.5	23 30 33.56	9.37½	43.61	0.58			
33	W. C.	9.2	22.5	36.1	. .	3.0	23 32 36.03	8.73½					
34	Venus . . . N.P.	53.2	6.5	20.0	33.7	47.0	23 33 20.08	9.35½	44.05	0.62			
35	W. C.	2.6	16.3	29.5	. .	57.0	23 35 29.68	8.73½					
36	Venus . . . N.P.	47.2	0.5	14.0	27.5	41.0	23 36 14.04	9.26½	44.36	0.53			
37	W. C.	52.0	5.5	19.1	. .	45.5	23 38 18.85	8.78					
38	Venus . . . N.P.	36.5	. .	3.5	17.0	30.5	23 39 3.51	9.30½	44.66	0.52½			
39	W. C.	25.0	38.5	52.0	. .	19.0	23 42 51.95	8.71½					
40	Venus . . . N.P.	10.0	23.5	37.0	50.4	3.5	23 43 36.88	9.22½	44.93	0.51			
41	W. C.	17.5	31.2	44.6	. .	. .	23 45 44.49	8.70					
42 *b*	Venus . . . N.P.	3.0	16.5	29.5	43.2	56.8	23 46 29.80	9.16	45.31	0.46			
43	W. C.	4.1	17.5	31.0	. .	59.5	23 48 31.35	8.66					
44	Venus . . . N.P.	49.5	3.2	17.0	30.0	43.5	23 49 16.64	9.19½	45.29	0.53½			
45	W. C	54.3	7.5	21.0	. .	. .	23 51 20.99	8.63					
46 *b*	Venus . . . N.P.	39.9	53.5	7.0	20.5	34.0	23 52 6.98	9.13	45.99	0.50			
47	W. C.	14.5	28.1	42.0	. .	8.5	23 54 41.60	8.66					
48	Venus . . . N.P.	0.8	14.0	27.5	41.0	54.8	23 55 27.62	9.19	46.02	0.53			
49	W. C.	53.5	7.2	20.8	. .	. .	23 57 20.56	8.66					
50 *b*	Venus . . . N.P.	41.0	53.5	7.0	20.5	34.0	23 58 7.20	9.11	46.64	0.45			
51	W. C.	39.0	52.5	6.0	. .	. .	0 0 5.89	8.73½					
52 *b*	Venus . . . N.P.	25.5	39.0	52.5	6.0	19.5	0 0 52.50	9.15	46.61	0.41½			
53	W. C.	18.5	32.3	45.5	. .	. .	0 2 45.49	8.81					
54	Venus . . . N.P.	5.5	18.5	32.2	45.5	59.1	0 3 32.16	9.26	46.67	0.45			
55	W. C.	25.2	39.0	52.0	. .	. .	0 5 52.12	8.81					
56	Venus . . . N.P.	12.0	25.5	39.0	52.2	6.0	0 6 38.94	9.28½	46.82	0.47½			
57	W. C.	54.5	8.0	21.5	. .	. .	0 9 21.39	8.92					
58 *c*	Venus . . . N.P.	41.5	54.5	9.0	22.3	36.0	0 10 8.66	—9.33	+47.27	—0.41			

Remarks.

By far the finest night and most satisfactory measures during the series. Both objects were extremely well defined and their motions steady. The first two measures were made by daylight, and there were also four measures made under like circumstances with a following star; but they are not copied from the original.

a Both fine observations.
b Tremulous.
c Extremely tremulous.

NOVEMBER 11, 1850—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . .	Twenty-nine transits . .	23 27 45.74	+43.56	—0.632	=0 12.32

	h. m.	m. s.		h. m. s.
Correction for chronometer at	23 28 . . .	—3 42.85	Santiago sid. time N. P.	23 24 2.89

	h. m.	″
$\Delta\rho$ at	23 24	0.01

NOVEMBER 12, 1850.

Cloudy.

NOVEMBER 13, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	W. C.	6.5	20.2	33.4	47.5	. .	22 39 33.59	—13.36			28.062	62.5	52.3
2 b	Venus . . . N.P.	. .	. .	47.5	1.0	14.5	22 40 47.60	2.66	+1 14.01	+10.70			
3 a	W. C.	32.6	46.2	59.5	13.0	26.5	22 42 59.56	14.09½			Ther. att. 63°.4 Bar. red. to 32° F. 27.969		
4	Venus . . . N.P.	. .	0.6	14.0	27.5	41.0	22 44 14.07	3.32½	1 14.51	10.77			
5	W. C.	33.8	47.2	0.7	14.0	27.5	22 51 0.64	13.47					
6	Venus . . . N.P.	. .	2.6	15.8	29.0	42.5	22 52 15.77	2.63	1 15.13	10.84			
7 c	W. C.	32.0	45.5	59.0	12.2	25.8	22 54 58.90	13.51					
8	Venus . . . N.P.	47.5	1.2	15.0	28.2	41.5	22 56 14.68	2.62½	1 15.78	10.88½			
9	W. C.	51.0	4.5	17.8	. .	44.5	23 0 17.78	13.79					
10	Venus . . . N.P.	7.0	20.5	34.0	47.3	1.0	23 1 33.96	2.90	1 16.18	10.89			
11	W. C.	34.8	48.0	1.2	. .	28.2	23 5 1.37	13.70					
12	Venus . . . N.P.	51.5	4.2	17.5	31.0	44.3	23 6 17.70	2.76	1 16.33	10.94			
13 d	W. C.	50.0	3.2	16.6	. .	43.5	23 10 16.66	12.66½					
14	Venus . . . N.P.	6.5	20.2	33.5	47.0	0.5	23 11 33.54	1.55½	1 16.88	11.11			
15	W. C.	7.5	20.8	34.2	47.6	1.0	23 16 34.22	12.58					
16	Venus . . . N.P.	24.6	38.2	51.6	4.8	18.5	23 17 51.54	1.42	1 17.32	11.16			
17	W. C.	49.4	2.6	16.0	29.5	43.0	23 21 16.10	15.54½					
18	Venus . . . N.P.	6.5	20.0	33.6	47.0	0.5	23 22 33.52	4.50½	1 17.42	11.04			
19	W. C.	34.0	47.6	1.0	14.2	27.6	23 25 0.88	15.71½					
20	Venus . . . N.P.	52.0	. .	18.8	32.3	45.8	23 26 18.87	4.56	1 17.99	11.15½			
21	W. C.	52.3	5.8	19.2	32.5	46.0	23 28 19.16	15.67					
22	Venus . . . N.P.	10.5	24.0	37.5	51.0	4.0	23 29 37.40	4.15	1 18.24	11.22			
23	W. C.	7.6	21.2	34.5	48.0	1.5	23 31 34.56	15.68½					
24	Venus . . . N.P.	26.2	39.5	53.1	6.5	20.0	23 32 53.06	4.45	1 18.50	11.23½			
25	W. C.	17.5	30.6	44.0	57.3	11.0	23 35 44.08	15.64½					
26	Venus . . . N.P.	36.1	49.5	2.8	16.0	29.5	23 37 2.78	4.34	1 18.70	11.30½			
27	W. C.	9.2	22.3	35.8	49.3	2.5	23 39 35.82	15.53					
28	Venus . . . N.P.	27.6	41.0	55.0	8.2	21.5	23 40 54.66	4.28	1 18.84	11.25			
29	W. C.	. .	47.0	0.5	13.5	27.0	23 43 0.29	15.64					
30	Venus . . . N.P.	52.5	6.0	19.5	32.8	46.3	23 44 19.42	4.31	1 19.13	11.33			
31	W. C.	12.5	25.7	39.3	52.5	6.2	23 46 39.24	15.59					
32	Venus . . . N.P.	32.0	45.2	58.8	12.0	25.5	23 47 59.70	4.28½	1 20.00	11.30½			
33	W. C.	43.4	56.6	10.0	23.5	37.1	23 50 10.12	15.64½					
34	Venus . . . N.P.	3.2	16.5	30.0	43.5	50.8	23 51 30.00	—4.26½	+1 19.88	+11.38			

NOVEMBER 13, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
35	W. C.	12.0	25.5	38.5	52.5	6.0	23 53 38.90	—15.66½			28.066	55.5	48.1
36	Venus . . . N.P.	32.2	45.5	59.0	12.2	25.5	23 54 58.88	4.22	+1 19.98	+11.44½			
37	W. C.	53.0	6.5	20.0	33.5	47.0	23 57 20.00	15.66			Ther. att. 62°.0 Bar. red. to 32° F. 27.977		
38	Venus . . . N.P.	13.5	27.0	40.5	53.6	7.2	23 58 40.36	4.20½	1 20.36	11.45½			
39	W. C.	30.5	44.3	57.8	11.0	24.7	0 0 57.66	15.68					
40	Venus . . . N.P.	51.5	5.0	18.5	31.8	45.5	0 2 18.46	4.21	1 20.80	11.47			
41	W. C.	43.7	57.3	10.5	24.0	37.5	0 5 10.60	15.77					
42 *d*	Venus . . . N.P.	5.0	18.5	31.5	45.0	58.6	0 6 31.72	4.33	1 21.12	11.44			
43	W. C.	44.8	58.2	11.5	25.0	38.6	0 10 11.62	16.14					
44	Venus . . . N.P.	6.2	19.5	33.0	46.5	0.0	0 11 33.04	4.52	1 21.42	11.62			
45	W. C.	36.2	49.6	3.4	16.6	30.2	0 14 3.20	16.22					
46	Venus . . . N.P.	57.6	11.0	24.5	38.0	51.5	0 15 24.52	4.64	1 21.32	11.58			
47	W. C.	18.0	31.5	45.0	58.4	12.0	0 17 44.98	16.29					
48	Venus . . . N.P.	40.2	53.5	7.0	20.5	33.6	0 19 6.96	— 4.72	+1 21.98	+11.57			

Remarks.

Night clear, though the planet (seen with the diminished aperture) was never either sharply defined or steady, and the measures can only be considered fair.

a These two observations were made by daylight, though the lamps were lighted.

b Recorded 37.5*s*. and 51.0*s*. at wires C and D, respectively.

c Recorded 27.0*s*. at wire A.

d Tremulous.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . .	Twenty-four transits . .	23 33 1.34	+1 18.83	+11.212	= 3 38.52

Correction for chronometer at 23 33 (h. m.) . . —3 45.74 (m. s.) Santiago sid. time N. P. . . . . 23 29 15.60 (h. m. s.)

Δ ρ at 23 28 (h. m.) . . . . 0.15″

NOVEMBER 14, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	28.0	41.4	55.0	8.5	. .	22 58 54.92	— 6.24			27.943	72.7	57.8
2	W. C.	. .	31.5	45.0	58.4	12.0	22 59 45.02	12.14½	—50.10	+5.90½			
3	Venus . . . N.P.	25.0	38.4	52.0	5.4	. .	23 1 51.89	6.42			Ther. att. 69°.5 Bar. red. to 32° F. 27.832		
4	W. C.	. .	28.6	42.0	55.3	8.8	23 2 41.97	12.30	50.08	5.88			
5	Venus . . . N.P.	58.0	11.5	25.0	38.4	. .	23 5 24.92	6.28½					
6	W. C.	. .	1.0	14.5	28.0	41.2	23 6 14.47	—12.23½	—49.55	+5.95			

NOVEMBER 14, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
7	Venus . . . N.P.	3.0	16.5	30.1	43.2	. .	23 8 29.89	— 6.24½			27.943	72.7	57.8
8	W. C.	. .	6.0	19.5	32.7	46.2	23 9 19.40	12.20½	—49.51	+5.96			
9	Venus . . . N.P.	48.8	2.4	15.8	29.1	. .	23 11 15.72	6.21			Ther. att. 69°.5 Bar. red. to 32° F. 27.832		
10	W. C.	. .	51.3	5.0	18.1	31.8	23 12 4.85	12.13½	49.13	5.92½			
11	Venus . . . N.P.	48.5	2.0	15.5	28.8	. .	23 14 15.39	6.15½					
12	W. C.	. .	51.0	4.5	17.7	31.0	23 15 4.35	12.13	48.96	5.97½			
13 *a*	Venus . . . N.P.	43.5	57.0	10.5	23.7	. .	23 17 10.37	6.07½					
14	W. C.	. .	45.7	59.2	12.5	26.1	23 17 59.17	12.13½	48.80	6.06			
15	Venus . . . N.P.	2.5	16.0	29.4	42.8	. .	23 20 29.37	5.97					
16	W. C.	. .	4.5	17.9	31.2	44.7	23 21 17.87	11.96½	48.50	5.99½			
17	Venus . . . N.P.	15.2	28.5	42.2	55.5	. .	23 23 42.04	5.85					
18	W. C.	. .	17.3	30.5	43.7	57.4	23 24 30.52	11.91	48.48	6.06			
19	Venus . . . N.P.	8.1	21.5	35.1	48.4	. .	23 26 34.97	5.79					
20	W. C.	. .	9.5	23.0	36.5	50.2	23 27 23.10	11.86½	48.13	6.07½			
21	Venus . . . N.P.	1.0	14.5	27.8	41.3	. .	23 29 27.84	5.72					
22	W. C.	. .	2.5	15.8	29.0	42.6	23 30 15.77	11.89	47.93	6.17			
23	Venus . . . N.P.	54.5	8.0	21.3	34.8	. .	23 32 21.34	5.65					
24	W. C.	. .	55.7	9.0	22.5	36.0	23 33 9.10	11.82	47.76	6.17			
25	Venus . . . N.P.	45.5	58.5	12.5	25.8	. .	23 35 12.27	5.60					
26	W. C.	. .	46.3	59.5	13.1	26.7	23 35 59.70	11.78	47.43	6.18			
27	Venus . . . N.P.	39.0	52.7	6.0	19.5	. .	23 38 5.99	5.52½					
28	W. C.	. .	40.0	53.5	6.5	20.2	23 38 53.35	11.73	47.36	6.20½			
29	Venus . . . N.P.	11.5	25.5	38.5	52.3	. .	23 41 38.64	5.40					
30	W. C.	. .	12.3	25.7	39.2	52.8	23 42 25.80	11.64½	47.16	6.24½			
31	Venus . . . N.P.	10.5	23.8	37.5	50.5	. .	23 44 37.27	5.34					
32	W. C.	. .	10.5	24.0	37.5	51.0	23 45 24.05	11.69½	46.78	6.35½			
33 *b*	Venus . . . N.P.	5.0	18.0	31.5	44.8	. .	23 47 31.52	5.26½					
34	W. C.	. .	4.5	18.2	31.5	45.0	23 48 18.10	11.56	46.58	6.29½			
35	Venus . . . N.P.	18.5	32.0	45.4	58.8	. .	23 50 45.37	5.19					
36	W. C.	. .	18.2	31.7	44.8	58.5	23 51 31.60	11.52	46.23	6.33			
37	Venus . . . N.P.	16.5	30.3	43.6	57.0	. .	23 53 43.54	5.18					
38	W. C.	. .	16.2	29.8	43.0	56.5	23 54 29.67	11.53½	46.13	6.35½			
39	Venus . . . N.P.	9.0	22.4	36.0	49.4	. .	23 56 35.89	5.12					
40	W. C.	. .	8.1	21.5	35.0	48.8	23 57 21.65	11.51½	45.76	6.39½			
41	Venus . . . N.P.	7.5	21.2	34.6	48.3	. .	23 59 34.59	5.06½					
42	W. C.	. .	7.0	20.5	34.0	47.5	0 0 20.55	11.44	45.96	6.37½			
43	Venus . . . N.P.	4.5	18.1	31.7	45.1	. .	0 2 31.54	5.07					
44	W. C.	. .	3.5	. .	30.4	44.0	0 3 17.03	11.53½	45.49	6.46½			
45	Venus . . . N.P.	46.5	0.5	13.8	27.3	. .	0 6 13.72	5.08			27.958	63.7	56.1
46	W. C.	. .	45.5	59.0	12.5	26.2	0 6 59.10	11.59½	45.38	6.51½			
47	Venus . . . N.P.	50.0	3.5	17.0	30.5	. .	0 9 16.94	5.07			Ther. att. 67°.6 Bar. red. to 32° F. 27.582		
48	W. C.	. .	48.5	2.0	15.5	29.0	0 10 2.05	11.62	45.11	6 55			
49 *c*	Venus . . . N.P.	41.0	54.2	7.6	21.3	. .	0 11 7.72	5.01					
50	W. C.	. .	39.0	52.5	6.0	19.5	0 11 52.55	11.68	44.83	6.67			
51 *c*	Venus . . . N.P.	21.5	35.0	48.4	1.8	. .	0 14 48.37	5.10					
52	W. C.	. .	19.2	33.0	46.3	0.0	0 15 32.92	—11.74	—44.55	+6.64			

NOVEMBER 14, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
53 c	Venus . . . N.P.	10.8	24.2	37.6	51.0	. .	0 17 37.59	— 5.16			27.958	63.7	56.1
54	W. C.	. .	8.5	22.0	35.3	49.1	0 18 22.07	—11.88	—44.48	+6.72			

Remarks.

An extremely fine night throughout, both objects being defined with precision, and moving steadily. Except those marked "tremulous" and "blurred," it would not be possible for me to make better measures, when there is so little difference in the times of transit, and so large an angle through which to move the micrometer screw.

a Recorded 38.5s. at wire A. *b* Tremulous. *c* Blurred.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean . .	Twenty-seven transits . .	23 38 29.62	— 47.27	+6.238	=2 1.58

Correction for chronometer at 23 h. 38 m. . . — 3 m. 48.88 s. Santiago sid. time N. P. . . . . 23 h. 34 m. 40.74 s.

Δ ρ at 23 h. 35 m. . . . . 0″.09

NOVEMBER 15, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	18.3	31.8	45.1	58.5	12.0	22 49 45.14	—3.56			27.987	69.3	58.8
2	W. C.	0.0	14.0	27.3	40.6	54.0	22 51 27.18	2.71½	—1 42.04	—0.84½			
3	Venus . . . N.P.	39.2	52.5	6.0	19.4	32.8	22 53 5.98	3.41			Ther. att. 69°.4		
4	W. C.	21.4	34.6	48.1	1.5	15.2	22 54 48.16	2.60	1 42.18	0.81	Bar. red. to 32° F. 27.877		
5	Venus . . . N.P.	29.5	43.0	56.5	9.7	23.3	22 56 56.40	3.34					
6	W. C.	12.0	25.5	38.8	52.2	5.8	22 58 38.86	2.49	1 42.46	0.85			
7	Venus . . . N.P.	22.3	. .	. .	2.5	16.3	23 15 49.24	5.61½					
8	W. C.	6.5	20.1	33.5	46.8	0.4	23 17 33.46	4.54½	1 44.22	1.07			
9 a	Venus . . . N.P.	17.5	31.0	44.5	57.5	11.5	23 20 44.40	5.61½					
10	W. C.	2.0	15.5	28.6	42.0	55.8	23 22 28.78	4.51½	1 44.38	1.10			
11	Venus . . . N.P.	. .	37.5	51.0	4.2	17.8	23 24 50.92	5.45½					
12	W. C.	8.6	22.1	35.5	49.0	2.3	23 26 35.50	4.35½	1 44.58	1.10			
13	Venus . . . N.P.	58.0	11.5	25.0	38.0	51.8	23 28 24.86	5.47					
14	W. C.	42.8	56.2	. .	22.6	36.5	23 30 9.52	4.28	1 44.66	1.19			
15	Venus . . . N.P.	32.0	45.5	59.0	12.5	25.8	23 31 58.96	5.43					
16	W. C.	17.2	30.5	44.1	57.5	11.0	23 33 44.06	4.25	1 45.10	1.18			
17	Venus . . . N.P.	13.5	27.0	40.5	53.6	7.0	23 35 40.32	5.44					
18	W. C.	58.7	12.0	25.5	38.8	52.5	23 37 25.50	4.13½	1 45.18	1.30½			
19	Venus . . . N.P.	54.5	. .	21.5	34.3	48.0	23 40 21.22	5.33½					
20 b	W. C.	40.0	53.2	6.5	20.0	33.4	23 42 6.62	4.03½	1 45.40	1.30			
21	Venus . . . N.P.	. .	11.0	24.2	37.5	51.3	23 44 24.30	4.26					
22	W. C.	43.0	56.5	10.1	23.5	37.0	23 46 10.02	—2.90	—1 45.72	—1.36			

NOVEMBER 15, 1850—Continued.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
23	Venus . . . N.P.	. .	45.0	58.2	11.5	25.0	23 50 58.22	—4.17			28.006	63.0	56.5
24	W. C.	17.5	31.0	44.3	57.6	11.0	23 52 44.28	2.72	—1 46.05	—1.45			
25 c	Venus . . . N.P.	11.5	25.0	38.5	52.0	5.5	23 54 38.50	4.08½			Ther. att. 67°.3 Bar. red. to 32° F. 27.901		
26	W. C.	58.0	11.4	25.0	38.5	52.0	23 56 24.98	2.68	1 46.48	1.40½			
27	Venus . . . N.P.	11.8	25.3	39.0	52.0	5.5	23 58 38.72	4.09½					
28	W. C.	58.5	12.0	25.8	39.0	52.5	0 0 25.56	2.57½	1 46.84	1.52			
29	Venus . . . N.P.	45.0	58.3	11.8	25.0	38.5	0 2 11.72	4.12					
30	W. C.	32.0	45.5	58.8	12.2	25.5	0 3 58.80	—2.56½	—1 47.08	—1.55½			

Remarks.

Many cirri and much haze during the evening until wholly interrupted by clouds; but when the star was discernible, both objects were exceedingly sharp and the measures are very good. The first three measures were made by daylight.

a Recorded 45.0*s*. at wire C. *b* Tremulous. *c* Recorded 14.5*s*. at wire A.

Diameter of Venus from a mean of five measures at 22*h*. 30*m*. sid. time, 2.431 rev. Corrected diameter, 45″.18.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean of the first three transits	22 53 15.84	—1 42.23	—0.835	=0 16.27
Mean of the last eleven transits	23 39 3.45	—1 45.47	—1.296	=0 25.26

	m. s.		h. m. s.
Correction for chronometer at 22 53 (h. m.) . . .	—3 52.29	Santiago sid. time N. P.	22 49 23.55
Correction for chronometer at 23 39 . . .	—3 52.39	Santiago sid. time N. P.	23 35 11.06

	″		″
Δ ρ at 22 50 (h. m.)	0.01	Δ ρ at 23 36 (h. m.)	0.02

NOVEMBER 16, 1850.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	Venus . . . N.P.	39.3	53.2	6.0	19.4	32.8	22 53 6.14	—4.73½			27.954	71.3	57.4
2 b	W. C.	9.0	22.5	36.0	49.0	2.8	22 55 35.86	+3.26½	—2 29.72	—8.00			
3 a	Venus . . . N.P.	13.8	27.5	40.7	54.1	7.5	22 57 40.72	—4.20			Ther. att. 69°.8 Bar. red. to 32° F. 27.841		
4	W. C.	43.5	57.0	10.1	23.5	37.5	23 0 10.32	+3.80	2 29.60	8.00			
5 a	Venus . . . N.P.	41.5	55.0	8.5	21.7	35.1	23 2 8.36	—3.35					
6	W. C.	11.0	24.5	37.8	50.8	4.5	23 4 37.72	+4.60½	2 29.36	7.95½			
7	Venus . . . N.P.	27.5	41.0	54.5	7.8	21.1	23 9 54.38	—3.51					
8	W. C.	56.3	9.8	23.0	36.5	50.0	23 12 23.12	+4.31½	2 28.74	7.82½			
9	Venus . . . N.P.	8.2	21.8	35.2	48.3	1.8	23 14 35.06	—3.75					
10	W. C.	36.5	50.2	3.0	16.5	30.2	23 17 3.28	+4.05	2 28.22	7.80			
11	Venus . . . N.P.	50.0	3.5	16.5	30.0	43.5	23 19 16.70	—3 54					
12	W. C.	18.0	31.5	44.8	58.0	11.5	23 21 44.76	+4.15	—2 28.06	—7.69			

NOVEMBER 16, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
13	Venus . . . N.P.	35.5	49.5	2.8	16.2	29.5	23 24 2.70	—4.73½			27.954	71.3	57.4
14	W. C.	3.6	17.1	30.5	44.0	57.3	23 26 30.50	+2.96½	—2 27.80	—7.70			
15	Venus . . . N.P.	25.6	39.2	52.5	5.8	19.5	23 28 52.52	—4.56½			Ther. att. 69°.8 Bar. red. to 32° F. 27.841		
16	W. C.	53.3	6.8	20.0	33.5	46.8	23 31 20.08	+3.06½	2 27.56	7.63			
17	Venus . . . N.P.	57.2	10.9	23.9	37.3	50.8	23 33 24.02	—4.43½					
18	W. C.	24.5	38.0	51.3	4.5	17.9	23 35 51.24	+3.10½	2 27.22	7.54			
19	Venus . . . N.P.	40.5	54.0	7.3	20.5	34.3	23 38 7.32	—4.33					
20	W. C.	7.5	. .	34.2	47.5	1.0	23 40 34.21	+3.19	2 26.89	7.52			
21	Venus . . . N.P.	6.5	20.4	33.6	47.0	0.5	23 42 33.60	—4.24½					
22	W. C.	33.5	47.1	0.8	14.0	27.0	23 45 0.48	+3.22	2 26.88	7.46½			
23	Venus . . . N.P.	33.5	47.0	0.5	13.5	27.0	23 47 0.30	—4.12					
24	W. C.	59.9	13.5	26.6	40.0	53.5	23 49 26.70	+3.30	2 26.40	7.42			
25	Venus . . . N.P.	18.5	32.0	45.3	58.5	12.0	23 51 45.26	—4.02½					
26	W. C.	44.5	58.0	11.5	24.6	38.0	23 54 11.32	+3.32½	2 26.06	7.35			
27	Venus . . . N.P.	55.5	8.8	22.4	35.5	49.1	23 56 22.26	—3.91					
28	W. C.	21.2	34.8	48.0	1.2	14.5	23 58 47.94	+3.36½	2 25.68	7.27½			
29	Venus . . . N.P.	22.8	36.3	49.8	3.2	16.5	0 0 49.72	—3.83					
30	W. C.	48.2	1.8	15.0	28.3	41.8	0 3 15.02	+3.42	2 25.30	7.25			
31	Venus . . . N.P.	51.5	5.2	18.5	32.0	45.3	0 5 18.50	—3.76			27.969	66.0	55.8
32	W. C.	16.8	30.5	43.8	57.0	10.5	0 7 43.72	+3.42	2 25.22	7.18			
33	Venus . . . N.P.	20.5	34.1	47.5	0.7	14.3	0 9 47.42	—3.76			Ther. att. 68°.0 Bar. red. to 32° F. 27.862		
34	W. C.	45.5	59.0	12.2	25.7	39.0	0 12 12.28	+3.34½	2 24.86	7.10½			
35	Venus . . . N.P.	45.1	58.5	12.0	25.4	39.0	0 14 12.00	—3.79					
36	W. C.	10.0	23.1	36.5	49.5	3.4	0 16 36.50	+3.30	—2 24.50	—7.09			

Remarks.

Fair night and good measures.

a Measures by daylight. *b* Somewhat close. *c* Tremulous.

Results.

Mean . . . Eighteen transits . . . 23h 34m 56.19s — $-2^m\ 27.11^s$ . . . —7.544 Rev. . . . . $= 2'\ 27.03''$

Correction for chronometer at 23h 35m . . — 3m 57.76s — Santiago sid. time N. P. 23h 30m 58.43s

Δ ρ at 23h 32m . . . . 0.10″

NOVEMBER 17, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	Venus . . . N.P.	18.5	32.0	45.4	58.6	12.2	22 57 45.34	— 3.83½			28.064	69.6	56.0
2 b	W. C.	. .	36.0	49.3	2.5	16.4	22 58 49.36	10.83	—1 4.02	+6.99½			
3 a	Venus . . . N.P.	1.2	14.5	28.0	41.4	54.8	23 1 27.98	3.52½			Ther. att. 69°.0 Bar. red. to 32° F. 27.954		
4	W. C.	. .	18.5	32.0	45.3	58.8	23 2 31.96	10.65	1 3.98	7.12½			
5 a	Venus . . . N.P.	32.5	46.0	59.4	12.5	26.0	23 4 59.28	3.37					
6	W. C.	. .	50.0	3.2	16.5	29.8	23 6 3.18	10.58	1 3.90	7.21			
7 a	Venus . . . N.P.	7.5	20.8	34.0	47.4	1.0	23 8 34.14	3.24½					
8	W. C.	. .	24.5	38.0	51.0	4.5	23 9 37.81	10.54½	1 3.67	7.30			
9 c	Venus . . . N.P.	51.5	5.0	18.5	31.8	45.1	23 16 18.38	4.73½					
10	W. C.	. .	7.4	21.2	34.3	48.0	23 17 21.03	12.24½	1 2.65	7.51			
11 d	Venus . . . N.P.	57.0	10.5	24.2	37.5	51.0	23 20 24.04	4.82					
12	W. C.	. .	13.6	27.0	40.5	53.7	23 21 27.01	12.22½	1 2.97	7.40½			
13	Venus . . . N.P.	4.5	17.5	31.0	44.4	57.8	23 24 31.04	4.91					
14	W. C.	. .	20.2	34.0	47.0	0.5	23 25 33.73	12.41	1 2.69	7.50			
15	Venus . . . N.P.	38.5	52.0	. .	18.5	32.3	23 28 5.25	4.85					
16	W. C.	. .	54.5	7.5	21.0	. .	23 29 7.67	12.33½	1 2.42	7.48½			
17	Venus . . . N.P.	38.2	51.6	5.0	18.5	32.0	23 33 5.06	4.64					
18	W. C.	. .	53.7	7.0	20.5	34.0	23 34 7.11	12.23	1 2.05	7.59			
19	Venus . . . N.P.	58.0	11.2	24.5	38.0	51.4	23 36 24.62	4.58½					
20	W. C.	. .	13.1	26.8	40.0	53.5	23 37 26.66	—12.38	—1 2.04	+7.79½			

Remarks.

Owing to the tremor, bad definition, and blurred appearance of both objects all the evening, the observations have been extremely unsatisfactory.

a Observations by daylight.
b Recorded 26.0*s*. at wire B.
c Lamps just trimmed.
d Very tremulous.

Results.

Mean . . . Ten transits	h. m. s. 23 17 9.51	m. s. —1 3.04	Rev +7.391	′ ″ =2 24.05
Correction for chronometer at 23 17 (h. m.) . . .	m. s. —3 59.12	Santiago sid. time N. P.		h. m. s. 23 13 10.49
Δ ρ at 23 14 (h. m.)		″ 0.08		

NOVEMBER 18, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	23.5	36.6	50.2	3.5	17.0	23 0 50.16	—2.97			28.025	73.0	54.0
2	W. C.	23.5	37.2	50.5	4.0	17.5	23 2 50.54	11.69	—2 0.38	+8.72			
3	Venus . . . N.P.	28.6	42.2	55.5	8.7	22.5	23 4 55.50	2.88½			Ther. att. 71°.7 Bar. red. to 32° F. 27.908		
4	W. C.	29.0	42.5	55.5	9.2	22.6	23 6 55.76	11.61	2 0.26	8.72½			
5	Venus . . . N.P.	24.2	37.5	51.0	4.4	17.6	23 8 50.94	2.74					
6	W. C.	24.5	37.5	51.0	4.5	18.0	23 10 51.10	—11.45½	—2 0.16	+8.71½			

NOVEMBER 18, 1850—Continued.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
7 a	Venus . . .	N.P.	40.1	53.5	7.0	20.3	33.6	23 13 6.90	—2.30⅓			28.025	73.0	54.0
8	W. C.		40.4	53.5	7.0	20.3	33.5	23 15 6.94	11.18⅔	—2 0.04	+8.88			
9 b	Venus . . .	N.P.	39.0	52.4	6.0	19.2	32.6	23 20 5.84	3.27			Ther. att. 71°.7		
10	W. C.		38.6	52.0	5.3	18.5	32.0	23 22 5.28	12.33	1 59.44	9.06	Bar. red. to 32° F. 27.908		
11 c	Venus . . .	N.P.	41.6	55.0	8 5	21.8	35.3	23 24 8.44	3.46					
12	W. C.		41.0	54.2	7.8	20.8	34.5	23 26 7.66	12.47	1 59.22	9.01			
13 d	Venus . . .	N.P.	24.5	38.0	51.4	4.6	18.0	23 28 51.30	3.62					
14	W. C.		23.5	37.0	50.5	3.5	17.0	23 30 50.30	12.71	1 59.00	9.09			
15	Venus . . .	N.P.	23.5	36.8	50.4	3.5	17.0	23 32 50.24	4.51					
16	W. C.		22.5	. .	49.0	2.5	15.8	23 34 49.10	13.61⅓	1 58.86	9.10⅓			
17	Venus . . .	N.P.	37.0	50.5	3.9	17.2	30.6	23 37 3.84	4.42					
18	W. C.		35.6	49.0	2.5	15.7	29.3	23 39 2.42	13.61	1 58.58	9.19			
19	Venus . . .	N.P.	58.2	11.5	25.0	38.5	51.8	23 41 25.00	4.32					
20	W. C.		56.8	10.0	23.5	36.8	50.4	23 43 23.50	13.62	1 58.50	9.30			
21	Venus . . .	N.P.	10.0	23.5	37.0	50.4	3.6	23 45 36.90	4.19					
22	W. C.		8.5	21.6	35.2	48.5	2.0	23 47 35.16	13.47	1 58.26	9.28			
23	Venus . . .	N.P.	9.0	22.5	36.1	49.2	2.5	23 49 35.86	4.02⅓					
24	W. C.		7.0	20.6	34.0	47.3	0.8	23 51 33.94	13.39⅓	1 58.08	9.37			
25	Venus . . .	N.P.	1.5	14.6	28.0	41.4	55.0	23 53 28.10	3.83					
26	W. C.		59.1	12.8	26.0	39.2	52.8	23 55 25.98	13.30⅓	1 57.88	9.47⅓			
27	Venus . . .	N.P.	39.0	52.8	6.0	19.5	33.0	23 57 6.06	3.85					
28	W. C.		37.0	50.5	3.8	17.0	30.5	23 59 3.76	13.30	1 57.70	9.45			
29	Venus . . .	N.P.	35.5	48.8	2.3	15.5	29.0	0 1 2.22	3.46					
30	W. C.		33.0	46.5	59.6	13.0	26.5	0 2 59.72	13.03⅓	1 57.50	9.57⅓			
31	Venus . . .	N.P.	28.1	41.5	55.0	8.3	21.6	0 4 54.90	3.40					
32	W. C.		25.5	39.0	52.3	5.6	19.3	0 6 52.34	12.91	1 57.44	9.51			
33	Venus . . .	N.P.	55.5	8.7	22.5	35.5	49.0	0 9 22.24	3.26					
34	W. C.		52.5	5.8	19.5	32.8	46.0	0 11 19.32	12.90⅓	1 57.08	9.64⅓			
35	Venus . . .	N.P.	47.5	1.0	14.4	27.6	41.2	0 13 14.34	3.42⅓					
36	W. C.		44.2	57.8	11.1	24.5	38.0	0 15 11.12	13.06⅔	1 56.78	9.64			
37	Venus . . .	N.P.	52.5	6.5	19.5	32.5	46.4	0 17 19.48	3.43					
38 e	W. C.		49.1	2.5	16.0	29.3	43.0	0 19 15.98	13.19⅔	1 56.50	9.76⅓			
39	Venus . . .	N.P.	47.0	0.5	13.8	27.1	40.5	0 21 13.78	3.43			28.024	66.0	53.4
40	W. C.		43.3	56.8	10.1	23.5	37.1	0 23 10.16	13.15⅓	1 56.38	9.72⅓			
41	Venus . . .	N.P.	41.5	55.0	8.5	21.5	35.4	0 25 8.38	3.48			Ther. att. 69°.3		
42	W. C.		37.8	51.0	4.5	18.0	31.5	0 27 4.56	13.36⅓	1 56.18	9.88⅓	Bar. red. to 32° F. 27.914		
43	Venus . . .	N.P.	42.5	56.0	9.5	23.0	36.5	0 29 9.50	3.66					
44	W. C.		38.5	52.0	5.5	18.8	32.5	0 31 5.46	—13.59⅓	—1 55.96	+9.93⅓			

Remarks.

All the measures by lamp-light are good, both objects being extremely well defined and steady.

a Observed by daylight.
b Images very sharp.
c Recorded 9.0*s*. at wire C.
d Excellent.
e Recorded 43.5*s*. at wire E.

NOVEMBER 18, 1850—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean	Twenty-two transits . .	23 46 19.20	—1 58.19	+ 9.320	= 3 1.65

	m. s.		h. m. s.
Correction for chronometer at 23h 46m . .	—4 2.52	Santiago sid. time N. P.	23 42 16.68

$\Delta \rho$ at 23h 44m . . . . 0″.15

NOVEMBER 19, 1850.

Unfavorable.

NOVEMBER 20, 1850.

On this night there were many cirri about the planet, which, with its tremulousness, the proximity of the star, and the small magnitude of the latter, prevented observations.

NOVEMBER 21, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1 a	Venus . . . N.P.	58.0	11.5	24.6	38.0	51.3	22 53 24.68	—4.78			27.897	64.7	56.3
2	B. A. C. . . 6194	. .	. .	15.2	28.2	41.8	22 54 15.09	3.70½	—50.41	—1.07½			
3 a	Venus . . . N.P.	54.6	8.1	21.6	35.0	. .	22 56 21.48	4.87			Ther. att. 68°.4		
4	B. A. C. . . 6194	. .	58.3	12.0	25.2	38.5	22 57 11.84	3.90	50.36	0.97	Bar. red. to 32° F.		
5 a	Venus . . . N.P.	50.8	4.0	17.6	30.5	. .	22 59 17.38	4.81			27.790		
6	B. A. C. . . 6194	. .	54.3	7.5	21.0	34.3	23 0 7.61	3.88	50.23	0.93			
7 a	Venus . . . N.P.	11.5	25.1	38.5	52.0	. .	23 2 38.43	4.72					
8	B. A. C. . . 6194	. .	15.4	28.8	41.8	55.3	23 3 28.66	3.82½	50.23	0.89½			
9 a	Venus . . . N.P.	51.3	4.7	18.1	31.3	. .	23 7 18.00	4.65½					
10	B. A. C. . . 6194	. .	54.8	8.2	21.5	34.5	23 8 8.09	3.83	50.09	0.82½			
11 a	Venus . . . N.P.	46.0	0.0	13.3	26.5	. .	23 12 13.10	4.82					
12	B. A. C. . . 6194	. .	49.5	3.0	16.3	29.8	23 13 2.99	4.14	49.89	0.68			
13 a	Venus . . . N.P.	20.5	34.0	47.1	0.5	. .	23 14 47.18	4.73½					
14	B. A. C. . . 6194	. .	23.5	37.0	50.3	3.5	23 15 36.91	4.02	49.73	0.71½			
15 b	Venus . . . N P.	59 5	13.0	26.0	. .	. .	23 17 26.13	4.63					
16	B. A. C. . . 6194	49.0	2.5	16.0	29.0	42.5	23 18 15.80	4.05½	49.67	0.57½			
17 b	Venus . . . N.P.	45.0	58.5	12.0	25.4	. .	23 20 11.88	4.55					
18	B. A. C. . . 6194	. .	48.5	1.5	14.5	28.2	23 21 1.51	3.97	49.63	0.58			
19 b	Venus . . . N.P.	33.2	46.5	59.5	13.3	. .	23 31 59.78	7.10					
20	B. A. C. . . 6194	. .	35.5	49.0	2.5	16.0	23 32 49.09	6.72	49.31	0.38			
21 c	Venus . . . N.P.	1.5	14.5	27.8	41.0	. .	23 36 27.85	6.64½					
22	B. A. C. . . 6194	. .	3.5	16.8	30.5	43.5	23 37 16.91	6.31	49.06	0.33½			
23	Venus . . . N.P.	52.5	6.0	18.8	32.3	. .	23 39 19 05	6.37					
24	B. A. C. . . 6194	. .	54.5	8.0	21.0	34.5	23 40 7.84	6.13½	48.79	0.23½			
25	Venus . . . N.P.	28.0	41.3	54.5	7.8	. .	23 41 54 55	6 19					
26	B. A. C. . . 6194	. .	30.1	43.5	56.5	10.0	23 42 43.36	6.03	48.81	0.16			
27	Venus . . . N.P.	4.5	17.5	31.0	44.4	. .	23 44 31.00	6.15					
28	B. A. C. . . 6194	. .	6.5	19.7	33.0	46.5	23 45 19.76	—6.02	—48.76	—0.13			

NOVEMBER 21, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α	Δ δ	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
29	Venus . . . N.P.	56.5	10.0	23.5	36.5	. .	23 47 23.28	—6.05			27.905	61.6	54.5
30	B. A. C. . . 6194	. .	58.5	12.0	25.3	39.0	23 48 12.04	5.94½	—48.76	—0.10½	Ther. att. 67°.8 Bar. red. to 32° F. 27.799		
31	Venus . . . N.P.	51.0	4.5	17.5	30.5	. .	23 50 17.53	5.94½					
32	B. A. C. . . 6194	. .	52.8	6.0	19.5	32.5	23 51 6.04	5.87	48.51	—0.07½			
33	Venus . . . N.P.	23.0	36.0	49.0	2.5	. .	23 52 49.28	5.79					
34	B. A. C. . . 6194	. .	24.1	37.5	50.6	4.5	23 53 37.51	5.79	48.23	±0.00			
35	Venus . . . N.P.	5.0	18.5	31.8	45.0	. .	23 55 31.73	5.76½					
36	B. A. C. . . 6194	. .	7.0	20 5	33.5	47.0	23 56 20.34	5.80	48.61	+0.03½			
37	Venus . . . N.P.	37.1	50.5	3.8	17.3	. .	23 58 3.83	5.61					
38	B. A. C. . . 6194	. .	39.0	52.0	5.5	19.0	23 58 52.21	5.72	48.38	0.11			
39	Venus . . . N.P.	24.5	37.5	51.0	4.5	. .	0 0 51.03	5.52					
40	B. A. C. . . 6194	. .	26.0	39.4	52.6	6.3	0 1 39.41	5.69½	48.38	0.17½			
41	Venus . . . N.P.	1.5	14.5	28.0	41.3	. .	0 3 27.98	5.41					
42	B. A. C. . . 6194	. .	3.0	16.2	29.5	43.0	0 4 16.26	5.69	48.28	0.28			
43	Venus . . . N.P	25.2	38.5	51.7	5.0	. .	0 5 51.75	5.39					
44	B. A. C. . . 6194	. .	26.5	40.0	53.3	7.0	0 6 40.04	—5.61	—48.29	+0.22			

Remarks.

Both objects have been blurred and unsteady all the evening. There has never been a good image, and the measures are not considered above mediocrity.

a Measures by daylight. Both objects much blurred and unsteady, there being a high SW. wind.

b Better observations.

c Lamps not in good order.

Results.

Mean . . Twenty-two transits . . . 23^h 32^m 22^s.13 — 49^s.20 . . . . . . — 0$^{Rev.}$.357 . . . . . . = 0′ 6″.96

Correction for chronometer at 23^h 32^m . . — 4′ 13″.51 Santiago sid. time N. P. . . . . 23^h 28^m 8^s.62

Δ ρ at 23^h 28^m . . . . 0″.00

NOVEMBER 22, 1850.

Completely overcast all day.

NOVEMBER 23, 1850.

It was found impossible to obtain an image which could be satisfactorily observed with the equatorial at any time during the evening.

NOVEMBER 24, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	Venus . . . N.P.	22.5	35.5	49.0	2.2	15.8	23 55 49.00	—4.01			27.912	72.6	60.0
2	W. C.	33.0	46.5	59.7	13.1	26.5	0 4 59.76	5.60½	—9 10.76	+1.59½			
3 b	Venus . . . N.P.	47.5	1.2	14.2	27.5	40.0	0 7 14.08	3.50			Ther. att. 67°.9		
4	W. C.	58.0	11.5	25.0	38.0	51.5	0 16 24.80	—5.50	—9 10.72	+2.00	Bar. red. to 32° F. 27.805		

Remarks.

a Very much blurred and unsteady.

b Too tremulous to be valuable.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean	Two transits . . .	0 1 31.54	—9 10.74	+ 1.797	= 0 35.02

Correction for chronometer at 0 h. 2 m. . . . — 4 m. 19.87 s.

Santiago sid. time N. P. . . . . 23 h. 57 m. 11.67 s.

Δ ρ at 0 h. 2 m. . . . . 0.03″

NOVEMBER 25, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	Venus . . . N.P.	13.3	26.5	39.7	53.0	6.4	23 47 39.78	—5.78			28.110	59.7	56.4
2	W. C.	14.5	27.8	41.0	54.2	7.5	23 53 41.00	5.72½	—6 1.22	—0.05½			
3 b	Venus . . . N.P.	29.5	42.5	56.0	9.0	22.3	23 56 55.86	5.60			Ther. att. 65°.2		
4	W. C.	30.5	43.5	56.8	10.0	23.5	0 2 56.86	5.75	6 1.00	+0.15	Bar. red. to 32° F. 28.012		
5	Venus . . . N.P.	18.5	31.5	44.8	59.0	12.3	0 4 45.22	5.69½					
6	W. C.	20.2	33.5	46.8	0.0	13.2	0 10 46.74	6.00	6 1.52	0.30½			
7	Venus . . . N.P.	11.2	24.5	37.8	51.0	4.2	0 12 37.76	5.52					
8	W. C.	12.5	26.0	39.1	52.2	5.5	0 18 39.06	6.03	6 1.30	0.51			
9	Venus . . . N.P.	9.0	22.5	35.5	48.5	2.3	0 20 35.56	5.28½					
10	W. C.	10.5	24.0	37.5	50.5	4.0	0 26 37.30	5.89	6 1.74	0.60½			
11	Venus . . . N.P.	55.5	8.6	21.6	35.0	48.5	0 28 21.84	5.43					
12	W. C.	56.5	9.5	23 0	36.3	50.0	0 34 23.06	6.28	6 1.22	0.85			
13	Venus . . . N.P.	51.5	5.0	18.2	31.5	44.5	0 36 18.14	5.75					
14	W. C.	52.7	6.0	19.0	32.0	. .	0 42 19.05	—6.74½	—6 0.91	+0.99½			

Remarks.

The night has been remarkably clear; but, owing to an unprecedented storm of rain, accompanied with thunder and lightning from 4 A. M. until 11½ A. M., there is so much moisture in the air that both objects are blazing and unsteady. The measures are therefore only fair.

a Measures by daylight.

b Lamps not working well.

NOVEMBER 25, 1850—Continued.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . .	Seven transits	0 12 27.74	—6 1.27	+0.480	=0 9.35

Correction for chronometer at 0 12 h. m. . . — 4 22.10 m. s. Santiago sid. time N. P. . . . . 0 8 5.64 h. m. s.

$\Delta\rho$ at 0 11 h. m. . . . . 0.01″

NOVEMBER 26, 1850.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	40.5	53.7	7.0	20.5	34.0	0 47 7.14	— 3.24			27.940	64.8	59.0
2	Taylor . . . 8458	27.5	. .	54.8	. .	21.5	0 50 54.54	16.63	—3 47.40	+13.39			
3	Venus . . . N.P.	16.0	29.5	43.2	56.5	10.0	0 54 43.04	6.02			Ther. att. 69°.5		
4	Taylor . . . 8458	. .	17.5	30.5	44.0	57.8	0 58 30.85	19.67	3 47.81	13.65	Bar. red. to 32° F. 27.832		
5	Venus . . . N.P.	16.5	29.8	43.5	56.5	10.1	1 0 43.28	8.32					
6	Taylor . . . 8458	. .	17.5	. .	44.0	57.5	1 4 30.85	—22.07½	—3 47.57	+13.75½			

Remarks.

Images good, but observations only fair.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . .	Three transits	0 54 11.15	— 3 47.59	+ 13.598	=4 26.03

Correction for chronometer at 0 54 h. m. . . . — 4 24.32 m. s. Santiago sid. time N. P. . . . . 0 49 46.83 h. m. s.

$\Delta\rho$ at 0 51 h. m. . . . . 1.35″

NOVEMBER 27, 1850.

Night cloudy.

NOVEMBER 28, 1850.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Venus . . . N.P.	32.5	45.8	59.0	12.0	25.5	23 54 58.96	—4.88			27.948	63.3	55.2
2	B. A. C. . . 6214	54.5	. .	21.0	34.0	47.5	23 58 20.94	15.78	—3 21.98	+10.90			
3 *a*	Venus . . . N.P.	53.1	6.2	19.5	32.5	46.0	0 2 19.46	8.94½			Ther. att. 65°.6		
4	B. A. C. . . 6214	15.2	28.5	41.7	54.6	8.2	0 5 41.64	19.96½	3 22.18	11.02	Bar. red. to 32° F. 27.848		
5 *b*	Venus . . . N.P.	. .	19.4	32.5	45.5	59.0	0 10 32.49	4.59½					
6	B. A. C. . . 6214	28.0	41.5	54.7	7.5	21.0	0 13 54.54	15.81	3 22.05	11.21½			
7	Venus . . . N.P.	42.0	55.0	8.5	21.7	35.0	0 17 8.44	4.98½					
8	B. A. C. . . 6214	4.5	17.5	31.0	44.3	57.5	0 20 30.06	16.45	3 22.52	11.46½			
9	Venus . . . N.P.	27.5	40.5	53.5	7.0	20.5	0 22 53.80	5.76½					
10	B. A. C. . . 6214	49.8	3.0	16.2	29.0	42.8	0 26 16.16	—17.33	—3 22.36	+11.59½			

NOVEMBER 28, 1850—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	Venus . . . N.P.	57.0	10.0	23.7	36.6	50.3	0 28 23.52	—6.16			27.948	63.3	53.2
12	B. A. C. . . 6214	. .	32.5	46.0	59.4	12.6	0 31 46.01	17.84	—3 22.49	+11.68			
13	Venus . . . N.P.	7.5	20.8	34.0	47.2	0.5	0 33 34.00	6.34			Ther. att. 65°.6		
14	B. A. C. . . 6214	30.0	43.5	56.6	10.0	23.2	0 36 56.66	18.12	3 22.66	11.78	Bar. red. to 32° F. 27.848		
15	Venus . . . N.P.	22.5	35.6	49.0	2.0	15.5	0 38 48.92	6.64					
16	B. A. C. . . 6214	45.0	58.3	11.6	24.9	38.2	0 42 11.60	18.49½	—3 22.68	+11.85½			
17	Venus . . . N.P.	49.5	3.2	16.5	29.5	43.0	0 44 16.34	—7.43½					
18 c	B. A. C. . . 6214	. .	. .	. .	. .	. .							

Remarks.

Objects blazing and very unstea dy all the evening. There is not a good measure among them, or at least there is not one so considered at the time of making it.

a Measures by daylight. *c* Lost in the haze.
b Lamps working badly.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean	Eight transits . . .	0 18 35.00	—3 22.36	+11.439	=3 42.95

Correction for chronometer at 0 h. 19 m. . . . — 4 m. 30.37 s. Santiago sid. time N. P. . . . . 0 h. 14 m. 4.63 s.

Δ ρ at 0 h. 16 m. . . . . 0″.37

NOVEMBER 29, 1850.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	52.5	5.5	18.8	32.1	45.4	0 34 18.86	— 2.35			28.018	56.7	51.5
2	W. C.	22.5	35.7	49.0	2.5	16.0	0 35 49.14	—16.98	—1 30.28	+14.63			

Remarks.

The differential measures were interrupted by clouds.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean	One transit	0 34 18.86	— 1 30.28 . . .	+ 14.630	=4 40.14

Correction for chronometer at 0 h. 34 m. . . . — 4 m. 32.30 s. Santiago sid. time N. P. . . . . 0 h. 29 m. 46.56 s.

Δ ρ at 0 h. 30 m. . . . . 0″.71

NOVEMBER 30, 1850.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	W. C.	9.5	22.7	35.8	. .	. .	0 17 35.81	—13.83			28.029	59.9	54.8
2	Venus . . . N.P.	. .	. .	1.0	14.3	27.5	0 18 1.11	8.61	+25.30	+5.22			
3	W. C.	40.0	53.0	6.5	. .	. .	0 21 6.31	13.78½			Ther. att. 61°.5 Bar. red. to 32° F. 27.932		
4	Venus . . . N.P.	. .	. .	31.5	44.5	58.0	0 21 31.51	8.55½	25.20	5.23			
5	W. C.	12.5	25.6	38.6	. .	. .	0 23 38.71	14.29½					
6	Venus . . . N P.	. .	. .	4.0	17.5	30.7	0 24 4.24	9.05½	25.53	5.24			
7	W. C.	30.7	44.0	57.3	. .	. .	0 27 57.14	14.70					
8	Venus . . . N.P.	. .	. .	22.6	35.6	49.0	0 28 22.57	9.33	25.43	5.37			
9	W. C.	10.2	23.5	36.8	. .	. .	0 30 36.64	14.85					
10	Venus . . . N.P.	. .	. .	1.5	15.0	28.3	0 31 1.77	9.46	25.13	5.39			
11	W. C.	51.0	4.5	17.6	. .	. .	0 33 17.51	15.06					
12	Venus . . . N.P.	. .	. .	42.5	55.8	9.3	0 33 42.71	9.64	25.20	5.42			
13	W. C.	17.6	31.0	44.2	. .	. .	0 35 44.07	15.35					
14	Venus . . . N.P.	. .	. .	9.3	22.5	35.8	0 36 9.37	9.67½	25.30	5.67½			
15	W. C.	40.5	54.0	7.5	. .	. .	0 38 7.14	15 55					
16 a	Venus . . . N P.	. .	. .	32.0	45.5	58.5	0 38 32.17	9.86	25.03	5.69			
17 b	W. C.	14.5	27.5	41.0	. .	. .	0 40 40.81	15.75½					
18	Venus . . . N.P.	. .	. .	5.7	18.9	32.5	0 41 5.87	—10.02	+25.06	+5.73½			

Remarks.

No good image during the measures. There was a storm of rain, thunder, and lightning over the city from 3¼ to 4 P. M , which has left a raw and moist atmosphere. The lightning struck within half a mile of the observatory; the only instance remembered when a house within the city experienced injury from such cause.

a Recorded 22.0s. at wire C. b Recorded 31.0s. at wire C.

Results.

		h m. s.	s.	Rev.	′ ″
Mean . . .	Nine transits	0 30 16.81	+25.24	+5.411	=1 46.05

Correction for chronometer at 0 30 (h. m.) . . . — 4 34.34 (m. s.) Santiago sid. time N. P. . . . . 0 25 42.47 (h. m. s.)

Δ ρ at 0 25 (h. m.) . . . . 0.27″

DECEMBER 1, 1850.

Cloudy.

DECEMBER 2, 1850.

Cloudy.

DECEMBER 3, 1850.														
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Venus . . . S.P.	. .	39.5	53.2	. .	. .	0 29 52.88	— 8.48			28.035	63.5	54.5
2	W. C.	. .	. .	23.0	. .	49.5	0 30 23.13	16.63½	—30.25	+8.15½			
3	Venus . . . S.P.	28.7	41.8	55.2	. .	. .	0 32 54.98	8.97½			Ther. att. 64°.5 Bar. red. to 32° F. 27.939		
4	W. C.	. .	. .	25.0	38.0	51.5	0 33 25.07	17.07	30.09	8.09½			
5	Venus . . . S.P.	57.5	10.5	23.7	. .	. .	0 35 23.65	9.13½					
6	W. C.	. .	. .	54.0	7.5	20.5	0 35 54.23	17.42½	30.58	8.29			
7	Venus . . . S.P.	45.5	58.5	11.7	. .	. .	0 38 11.65	9.53					
8	W. C.	. .	. .	42.5	. .	8.5	0 38 42.38	17.89½	30.73	8.36½			
9	Venus . . . S.P.	44.0	57.3	10.5	. .	. .	0 41 10.35	9.92½					
10	W. C.	. .	. .	41.5	. .	7.5	0 41 41.38	—18.51	—31.03	+8.58½			

Remarks.

Extremely blurred and indistinct. Measures by daylight. The star is not larger than 7.8th magnitude, instead of 6th magnitude, as in the Washington Catalogue.

Results.

		h. m. s.	s. Rev.	′ ″
Mean	Five transits . . .	0 35 30.70	—30.54 . . . . +8.298	=2 42.10

Correction for chronometer at 0 h. 35 m. . . . —4 m. 40.90 s. Santiago sid. time S. P. . . . . 0 h. 30 m. 49.80 s.

Δ ρ at 0 h. 31 m. . . . . 0″.56

DECEMBER 4, 1850.

At night the star was too distant for observation.

DECEMBER 5, 1850.

The star was seen too dimly for differential measurements with the equatorial.

Diameter of Venus from a mean of 10 measures at 0*h*. 30*m*. sid. time, 3.238 rev. Corrected diameter, 60″.91.

DECEMBER 29, 1850.

Unable to distinguish the comparing star in the morning twilight.

DECEMBER 31, 1850.

Comparing star undistinguishable in the morning twilight.

JANUARY 5, 1851.

Only the mornings of the 1st (2d civil) and 5th (6th civil) of January have been clear; but it has not been possible to distinguish the comparing star, when Venus was sufficiently above the horizon for observations.

JANUARY 6, 1851.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . .	S.F.	0.5	13.5	26.2	38.5	50.8	11 15 25.90	+ 1.72½			27.992	58.0	51.1
2	B. A. C. . .	5839	9.0	21.5	33.5	46.2	59.0	11 21 33.84	11.28	—6 7.94	—9.55½			
3	Venus . . .	S F.	20.5	33.5	46.0	58.5	11.0	11 23 45.90	1.54			Ther. att. 63°.3		
4	B. A. C. . .	5839	29.0	41.5	53.6	6.0	18.5	11 29 53.72	10.96	6 7.82	9.42	Bar. red. to 32° F. 27.899		
5	Venus . . .	S.F.	30.5	43.0	56.0	8.2	20.8	11 31 55.70	1.24					
6	B. A. C. . .	5839	38.5	51.0	3.5	16.0	28.5	11 38 3.50	10.59½	6 7.80	9.35½			
7	Venus . . .	S.F.	44.5	57.5	10.0	22.5	35.0	11 40 9.90	0.11					
8	B. A. C. . .	5839	52.5	5.0	. .	30.2	42.5	11 46 17.49	+ 9.53	—6 7.59	—9.42			

There were no remarks on this morning's observations.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . .	Four transits	11 27 49.35	— 6 7.79	— 9.437	= 3 3.93

Correction for chronometer at 11 h. 28 m. . . . — 42.30 s.

Santiago sid. time S. F. . . . . 11 h. 27 m. 7.05 s.

Δ ρ at 11 h. 30 m. . . . . 0″.24

JANUARY 7, 1851.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . .	S.F.	24.5	37.0	49.0	1.5	14.0	11 19 49.20	+5.96½			28.062	61.0	51.0
2	B. A. C. . .	5839	11.0	. .	37.5	50.0	2.5	11 25 37.14	5.25	—5 47.94	+0.71½			
3	Venus . . .	S.F.	38.5	51.5	3.5	. .	28.5	11 28 3.59	8.32			Ther. att. 63°.5		
4	B. A. C. . .	5839	26.5	39.7	51.6	4.2	16.6	11 33 51.72	7.54	5 48.13	0.78	Bar. red. to 32° F. 27.969		
5 a	Venus . . .	S.F.	30.3	43.0	55.2	7.5	20.3	11 35 55.26	8.47½					
6	B. A. C. . .	5839	. .	30.5	43.0	55.5	7.7	11 41 42.95	7.61	5 47.69	0.86½			
7	Venus . . .	S.F.	5.5	17.5	30.1	42.5	54.7	11 43 30.06	8.16½					
8	B. A. C. . .	5839	. .	. .	17.5	30.5	42.7	11 49 17.79	+7.31	—5 47.73	+0.85½			

Remarks.

All very fair measures.

a Measures by aylight.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . .	Four transits	11 31 49.53	— 5 47.87	+ 0.801 . . .	= 0 15.67

Correction for chronometer at 11 h. 32 m. . . . — 43.50 s.

Santiago sid. time S. F. . . . . 11 h. 31 m. 6.03 s.

Δ ρ at 11 h. 34 m. . . . . 0″.02

JANUARY 8, 1851.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	58.0	10.5	23.0	35.5	47.7	11 23 22.94	+11.94			28.033	56.8	52.0
2	B. A. C. . . 5839	17.5	. .	42.1	54.5	7.0	11 28 42.16	3.04	—5 19.22	+8.90			
3	Venus . . . S.F.	22.6	35.0	47.5	0.0	12.5	11 30 47.52	11.71			Ther. att. 64°.0 Bar. red. to 32° F. 27.938		
4	B. A. C. . . 5839	41.5	54.0	6.0	18.6	31.5	11 36 6.32	2.74	5 18.80	8.97			
5	Venus . . . S.F.	55.3	8.0	20.0	32.5	44.8	11 38 20.12	11.25					
6	B. A. C. . . 5839	. .	26.5	39.0	51.5	3.7	11 43 38.95	2.27½	5 18.83	8.97½			
7	Venus . . . S.F.	11.5	24.3	36.6	49.0	1.5	11 45 36.58	10.72½					
8	B A. C. . . 5839	30.5	43.0	55.5	7.8	20.0	11 50 55.36	1.69	5 18.78	9.03½			
9	Venus . . . S.F.	26.8	39.3	51.5	4.0	16.5	11 52 51.62	10.08					
10	B. A. C. . . 5839	45.0	57.8	10.0	22.5	35.0	11 58 10.06	+ 1.03	—5 18.44	+9.05			

Remarks.

Fine morning; objects steady, sharply defined, and the measures considered good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean	Five transits . . .	11 38 11.76	— 5 18.81	+ 8.986	= 2 55.14

Correction for chronometer at 11 38 (h. m.) . . . — 44.41 (s.)   Santiago sid. time S. F. . . . . 11 37 27.35 (h. m. s.)

Δ ρ at 11 40 (h. m.) . . . . 0.24 (″)

JANUARY 9, 1851.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	33.5	46.3	58.8	11.1	23.5	11 16 58.64	+18.43			28.010	60.6	55.4
2	B. A. C. . . 5839	15.0	27.5	40.0	52.3	4.8	11 21 39.92	3.52½	—4 41.28	+14.90½			
3	Venus . . . S.F.	21.8	33.8	46.7	59.2	11.6	11 23 46.62	18.34			Ther. att. 64°.6 Bar. red. to 32° F. 27.913		
4	B. A. C. . . 5839	2.5	15.0	27.5	40.0	52.5	11 28 27.50	3.40½	4 40.88	14.93½			
5	Venus . . . S.F.	8.6	21.0	33.5	46.0	58.3	11 30 33.48	17.91					
6	B. A. C. . . 5839	49.0	1.5	14.0	26.5	39.0	11 35 14.00	3.04	4 40.52	14.87			
7	Venus . . . S.F.	54.3	6.6	19.0	31.4	43.9	11 37 19.04	17.56					
8	B. A. C. . . 5839	34.5	47.0	59.3	11.6	24.0	11 41 59.28	2.51	4 40.24	15.05			
9 a	Venus . . . S.F.	32.0	. .	57.7	10.2	22.5	11 44 57.49	+14.85					
10 b	B. A. C. . . 5839	13.0	. .	38.3	50.5	3.0	11 49 38.09	— 0.27	4 40.60	15.12			
11	Venus . . . S.F.	5.5	18.0	30.5	42.8	55.1	11 52 30.38	+18.17					
12	B. A. C. . . 5839	45.5	58.0	10.5	23.0	35.3	11 57 10.46	3.02½	4 40.08	15.14½			
13	Venus . . . S.F.	1.5	14.0	26.5	39.0	51.3	11 59 26.46	20.22					
14	B. A. C. . . 5839	42.0	54.3	6.6	19.0	31.5	12 4 6.68	+5.02	—4 40.22	+15.20			

JANUARY 9, 1851—Continued.

Remarks.

Fine morning, clear images, and good measures.

a Measures by daylight. *b* Recorded 37.3s. at wire C.

Results.

	h. m. s.	m. s. Rev.	′ ″
Mean . . . Seven transits	11 37 56.02	—4 40.55 . . . . +15.032	=4 52.97
	h. m. s.		h. m. s.
Correction for chronometer at 11 38 . . .	—44.88	Santiago sid. time S. F.	11 37 11.14
	h. m.	″	
$\Delta\rho$ at 11 39		0.32	

JANUARY 10, 1851.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Venus . . .	S.F.	50.5	3.3	15.5	28.0	40.5	11 3 15.56	+22.08			28.020	60.0	54.7
2	B. A. C. . .	5839	45.0	57.5	10.0	22.4	35.2	11 7 10.02	3.03½	—3 54.46	+19.04½			
3 *a*	Venus . . .	S.F.	36.5	49.5	. .	14.3	26.7	11 10 1.70	20.31			Ther. att. 65°.0		
4	B. A. C. . .	5839	31.0	43.5	55.9	8.5	21.0	11 13 55.98	1.24	3 54.28	19.07	Bar. red. to 32° F.		
5 *b*	Venus . . .	S.F.	38.8	51.5	4.0	16.5	28.5	11 16 3.86	19.71½			27.922		
6	B. A. C. . .	5839	33.0	45.8	58.1	10.6	23.0	11 19 58.10	0.72	3 54.24	18.99½			
7	Venus . . .	S.F.	43.6	56.3	8.5	21.2	33.5	11 22 8.62	19.58½					
8	B. A. C. . .	5839	38.0	50.0	2.5	15.1	27.5	11 26 2.62	0.53	3 54.00	19.05½			
9	Venus . . .	S.F.	16.6	29.4	42.0	54.5	6.8	11 28 41.86	20.37					
10	B. A. C. . .	5839	10.5	23.0	35.5	47.8	0.4	11 32 35.44	1.30½	3 53.58	19.06½			
11 *c*	Venus . . .	S.F.	15.0	27.5	39.8	52.3	4.6	11 34 39.84	19.70					
12	B. A. C. . .	5839	8.1	20.6	33.0	45.5	57.9	11 38 33.02	0.61	3 53.18	19.09			
13 *d*	Venus . . .	S.F.	31.0	43.5	56.0	8.3	20.8	11 40 55.92	+19.02½					
14	B. A. C. . .	5839	24.0	36.8	49.5	1.5	14.0	11 44 49.16	—0.04	3 53.24	19.06½			
15 *e*	Venus . . .	S.F.	38.5	51.3	3.5	16.3	28.5	11 47 3.62	+18.43					
16	B. A. C. . .	5839	31.5	44.0	56.5	9.0	21.5	11 50 56.50	— 0.63	3 52.88	19.06			
17	Venus . . .	S.F.	53.5	6.0	18.5	. .	43.4	11 53 18.44	+17.80					
18	B. A. C. . .	5839	46.3	59.0	11.5	23.8	36.3	11 57 11.38	—1.29	3 52.94	19.09			
19	Venus . . .	S.F.	40.0	52.5	5.0	. .	29.5	12 0 4.84	+16.98½					
20	B. A. C. . .	5839	32.3	44.5	57.0	9.6	22.1	12 3 57.10	—2.09	3 52.26	19.07½			
21	Venus . . .	S.F.	0.5	13.0	25.5	37.8	50.3	12 6 25.42	+16.30½					
22	B. A. C. . .	5839	52.3	. .	17.0	29.5	42.5	12 10 17.21	— 2.81	—3 51.79	+19.11½			

Remarks.

It will be seen that the planet was not 3° from the horizon at the time of the first observation. During the first five measures the disk was blurred. The distance through which it was necessary to move the micrometer screw rendered absolute stability in the position of the instrument uncertain.

a Blurred. *b* Better. *c* Good. *d* Sharp. *e* Daylight.

Results.

	h. m. s.	m. s. Rev.	′ ″
Mean . . Eleven transits . , . .	11 34 47.24	—3 53.35 . . . . + 19.066	=6 12.60
	h. m. s.		h. m. s.
Correction for chronometer at 11 35 . . .	—45.11	Santiago sid. time S. F.	11 34 1.83
	h. m.	″	
$\Delta\rho$ at 11 36 . . , ...		0.43	

JANUARY 11, 1851.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	Venus . . . S.F.	45.0	57.5	10.0	22.5	35.0	11 4 10.00	+15.67½			27.992	58.9	53.6
2 b	B. A. C. . . 5839	43.5	56.0	8.5	21.0	33.5	11 7 8.50	— 5.49	—2 58.50	+21.16½			
3	Venus . . . S.F.	0.6	13.5	26.0	38.0	50.5	11 9 25.72	+16.66			Ther. att. 64°.5		
4	B. A. C. . . 5839	. .	. .	24.3	36.5	49.0	11 12 24.19	— 4.59	2 58.47	21.25	Bar. red. to 32° F.		
5 c	Venus . . . S.F.	22.5	35.0	47.5	0.0	12.5	11 14 47.50	+16.59			27.896		
6	B. A. C. . . 5839	20.8	33.0	45.5	58.0	10.5	11 17 45.56	— 4.68	2 58.06	21.27			
7	Venus . . . S.F.	45.5	58.5	10.8	23.5	35.8	11 20 10.82	+16.59					
8	B. A. C. . . 5839	43.5	56.0	8.0	20.5	33.5	11 23 8.30	— 4.73½	2 57.48	21.32½			
9	Venus . . . S.F.	55.7	8.3	20.8	33.2	45.5	11 25 20.70	—16.38					
10	B. A. C. . . 5839	53.2	5.5	18.2	30.5	43.0	11 28 18.08	+ 4.87½	2 57.38	21.25½			
11	Venus . . . S.F.	31.5	43.8	. .	8.5	21.5	11 30 56.37	+16.03					
12	B. A. C. . . 5839	28.5	41.0	53.5	6.0	18.5	11 33 53.50	— 5.19	—2 57.13	+21.22			

Remarks.

A fine morning until suddenly interrupted by a dense fog. The images were sharp and measures generally good.

a A little blurred. *b* Recorded 8.0*s*. at wire C. *c*. Good.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean	Six transits	11 17 28.52	—2 57.78	+21.247	=6 54.10

Correction for chronometer at 11 17 (h. m.) . . .	s. —45.88	Santiago sid. time S. F.	h. m. s. 11 16 42.64
Δ ρ at 11 18 (h. m.)	″ 0.79		

JANUARY 12, 1851.													
No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 a	Venus . . . S.F.	14.3	27.0	39.5	52.0	4.5	11 5 39.46	+18.09			27.983	66.2	60.3
2	B. A. C. . . 5839	. .	20.8	33.2	45.6	58.5	11 7 33.30	— 3.56½	—1 53.84	+21.65½			
3 a	Venus . . . S.F.	36.5	49.5	. .	13.8	26.5	11 10 1.52	+18.12½			Ther. att. 68°.0		
4	B. A. C. . . 5839	30.6	42.6	55.3	7.7	20.3	11 11 55.30	— 3.49	1 53.78	21.61½	Bar. red. to 32° F.		
5 b	Venus . . . S.F.	14.5	27.0	39.5	52.0	4.5	11 14 39.50	+18.33½			27.876		
6	B. A. C. . . 5839	8.0	20.5	33.0	45.8	58.0	11 16 33.06	— 3.31½	1 53.56	21.65			
7	Venus . . . S.F.	22.3	34.8	47.3	0.0	12.5	11 19 47.38	+18.22½					
8	B. A. C. . . 5839	15.5	27.8	40.5	53.0	5.2	11 21 40.40	— 3.35	1 53.02	21.57½			
9	Venus . . . S.F.	1.5	14.0	26.3	38.8	51.5	11 24 26.42	+18.07½					
10	B. A. C. . . 5839	54.5	7.0	19.5	31.8	44.5	11 26 19.46	— 3.51	1 53.04	21.58½			
11 c	Venus . . . S F.	8.3	21.0	33.5	46.0	59.3	11 28 33.62	+17.88					
12	B. A. C. . . 5839	2.5	15.0	27.5	39.7	52.0	11 30 27.34	— 3.65½	—1 53.72	+21.53½			

JANUARY 12, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
13 *d*	Venus . . . S.F.	22.8	35.4	47.8	0.3	12.8	11 32 47.82	+17.83½			27.983	66.2	60.3
14	B. A. C. . . 5839	15.5	28.0	40.5	53.0	5.3	11 34 40.46	— 3.74	—1 52.64	+21.57½			
15	Venus . . . S.F.	45.2	58.0	10.3	22.5	35.0	11 37 10.20	+17.56½			Ther. att. 68°.0 Bar. red. to 32° F. 27.876		
16	B. A. C. . . 5839	37.5	50.3	3.0	15.3	27.8	11 39 2.78	— 4.03½	1 52.58	21.60			
17 *e*	Venus . . . S.F.	45.3	58.0	10.5	22.8	35.2	11 41 10.36	+17.29½					
18	B. A. C. . . 5839	38.2	50.3	2.5	15.0	27.3	11 43 2.66	— 4.28	1 52.30	21.57½			
19	Venus . . . S.F.	. .	6.5	18.8	31.3	43.6	11 45 18.83	+16.96					
20	B. A. C. . . 5839	46.0	58.5	10.8	23.1	35.6	11 47 10.80	— 4.63½	1 51.97	21.59½			
21	Venus . . . S.F.	56.8	9.2	21.6	34.0	46.5	11 49 21.62	+16.57½					
22	B. A. C. . . 5839	49.0	1.5	13.6	25.5	38.3	11 51 13.58	— 5.00	1 51.96	21.57½			
23 *f*	Venus . . . S.F.	11.0	23.5	35.8	48.4	0.8	11 53 35.90	+16.22					
24	B. A. C. . . 5839	2.5	15.5	28.0	40.3	52.8	11 55 27.82	— 5.36	1 51.92	21.58			
25	Venus . . . S.F.	13.8	26.2	38.8	51.2	3.5	11 57 38.70	+15.81½					
26	B. A. C. . . 5839	5.0	17.8	30.5	42.8	55.1	11 59 30.24	— 5.75	1 51.54	21.56½			
27 *g*	Venus . . . S.F.	56.8	9.4	22.0	34.3	46.8	12 2 21.86	+15.17					
28	B. A. C. . . 5839	48.5	0.5	13.0	25.5	38.0	12 4 13.10	— 6.40½	1 51.24	21.57½			
29	Venus . . . S.F.	55.5	8.0	20.5	32.8	45.3	12 6 20.42	+14.76½					
30	B. A. C. . . 5839	46.5	59.0	11.5	23.8	36.5	12 8 11.46	— 6.76½	1 51.04	21.53			
31	Venus . . . S.F.	3.5	16.0	28.5	40.5	53.2	12 10 28.34	+14.28					
32	B. A. C. . . 5839	54.3	6.7	19.1	31.5	44.0	12 12 19.12	— 7.28½	1 50.78	21.56½			
33	Venus . . . S.F.	4.5	17.3	29.8	41.9	54.3	12 14 29.56	+13.84					
34	B. A. C. . . 5839	56.0	8.3	20.6	32.6	45.3	12 16 20.56	— 7.72	1 51.00	21.56			
35	Venus . . . S.F.	1.5	13.5	26.0	38.5	50.8	12 18 26.06	+13.34					
36	B. A. C. . . 5839	. .	4.0	16.5	29.0	41.3	12 20 16.48	— 8.23½	—1 50.42	+21.57½			

Remarks.

This has been by far the finest morning during the series. The atmosphere clear and all the measures satisfactory after the first five. A minute star (and the only one) is now seen for the first time in the field with B. A. C. 5839.

a Blurred.
b Better.
c Sharp image.
d Clean image.
e I cannot make better measures than these.
f Daylight.
g Excellent.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . .	Eighteen transits . .	11 42 54.31	—1 52.24 . . .	+ 21.582 . . .	= 7 0.63

Correction for chronometer at 11h 43m . . . —46s.12 Santiago sid. time S. F. 11h 42m 8s.19

Δ ρ at 11h 43m . . . . 0″.44

JANUARY 13, 1851.

The star and planet were too near in A. R. to move the micrometer screw through so large an arc whilst they passed across the field.

JANUARY 14, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	B. A. C. . . 5839	47.5	0.0	. .	. .	. .	11 16 12.38	+ 3.20			27.988	63.0	57.4
2	Venus . . . S.F.	28.5	41.0	. .	. .	19.2	11 16 53.68	—13.99	+41.30	—17.19			
3	B. A. C. . . 5839	6.5	19.0	. .	. .	. .	11 19 31.38	+ 3.12			Ther. att. 70°.6		
4	Venus . . . S.F.	48.0	. .	13.0	. .	38.0	11 20 12.94	—14.04	41.56	17.16	Bar. red. to 32° F.		
5	B. A. C. . . 5839	58.5	. .	23.5	. .	. .	11 23 23.42	+ 3.18			27.873		
6	Venus . . . S.F.	. .	52.5	. .	. .	30.5	11 24 5.25	—14.02½	41.83	17.20½			
7	B. A. C. . . 5839	53.5	6.0	. .	. .	. .	11 26 18.38	+ 3.15					
8	Venus . . . S.F.	35.5	. .	. .	13.2	25.5	11 27 0.58	—13.96	42.20	17.11			
9	B. A. C. . . 5839	7.8	20.5	. .	. .	. .	11 30 32.78	+ 4.08					
10	Venus . . . S.F.	49.3	. .	. .	27.5	40.3	11 31 14.88	—13.05	42.10	17.13			
11	B. A. C. . . 5839	25.0	. .	50.5	. .	. .	11 33 50.17	+ 4.72					
12	Venus . . . S.F.	. .	. .	32.5	. .	57.7	11 34 32.65	—12.37	42.48	17.09			
13	B. A. C. . . 5839	56.5	9.0	. .	. .	. .	11 38 21.38	+ 4.92½					
14	Venus . . . S.F.	38.8	. .	. .	16.5	28.8	11 39 3.88	—12.22½	42.50	17.15			
15	B. A. C. . . 5839	. .	. .	. .	. .	. .	. . . . .	+ 5.16					
16 a	Venus . . . S.F.	. .	. .	47.2	. .	. .	11 41 47.20	—11.96	. .	17.12			
17	B. A. C. . . 5839	. .	. .	14.5	. .	. .	11 44 14.50	+ 5.39					
18	Venus . . . S.F.	. .	. .	57.2	. .	. .	11 44 57.20	—11.73	42.70	17.12			
19	B. A. C. . . 5839	. .	. .	37.3	. .	. .	11 46 37.30	+ 5.63½					
20	Venus . . . S.F.	. .	. .	20.3	. .	. .	11 47 20.30	—11.49	43.00	17.12½			
21	B. A. C. . . 5839	. .	. .	15.0	. .	. .	11 49 15.00	+ 5.87½					
22	Venus . . . S.F.	. .	. .	58.0	. .	. .	11 49 58.00	—11.20½	43.00	17.08			
23	B. A. C. . . 5839	. .	. .	49.0	. .	. .	11 51 49.00	+ 6.13					
24	Venus . . . S.F.	. .	. .	32.3	. .	. .	11 52 32.30	—11.00	43.30	17.13			
25	B. A. C. . . 5839	. .	. .	31.1	. .	. .	11 54 31.10	+ 6.40					
26	Venus . . . S.F.	. .	. .	14.2	. .	. .	11 55 14.20	—10.79½	43.10	17.19½			
27	B. A. C. . . 5839	. .	. .	2.2	. .	. .	11 57 2.20	+ 6.61					
28	Venus . . . S.F.	. .	. .	45.5	. .	. .	11 57 45.50	—10.56½	43.30	17.17½			
29	B. A. C. . . 5839	. .	. .	17.8	. .	. .	11 59 17.80	+ 6.85					
30	Venus . . . S.F.	. .	. .	1.6	. .	. .	12 0 1.60	—10.25	43.80	17.10			
31	B. A. C. . . 5839	. .	. .	45.5	. .	. .	12 1 45.50	+ 7.13½					
32	Venus . . . S.F.	. .	. .	29.4	. .	. .	12 2 29.40	— 9.98	43.90	17.11½			
33	B. A. C. . . 5839	. .	. .	9.5	. .	. .	12 4 9.50	+ 7.41½					
34	Venus . . . S.F.	. .	. .	53.5	. .	. .	12 4 53.50	— 9.71	44.00	17.12½			
35 b	B. A. C. . . 5839	. .	. .	39.7	. .	. .	12 6 39.70	+ 7.65½					
36	Venus . . . S.F.	. .	. .	23.5	. .	. .	12 7 23.50	— 9.44	43.80	17.09½			
37	B. A. C. . . 5839	. .	. .	11.0	. .	. .	12 9 11.00	+ 7.90					
38	Venus . . . S.F.	. .	. .	54.8	. .	. .	12 9 54.80	— 9.18	43.80	17.08			
39	B. A. C. . . 5839	. .	. .	43.4	. .	. .	12 11 43.40	+ 8.26					
40	Venus . . . S.F.	. .	. .	27.8	. .	. .	12 12 27.80	— 8.80	44.40	17.06			
41	B. A. C. . . 5839	. .	. .	5.5	. .	. .	12 14 5.50	+8.46½					
42	Venus . . . S.F.	. .	. .	50.3	. .	. .	12 14 50.30	—8.56	44.80	17.02½			
43	B. A. C. . . 5839	. .	. .	43.2	. .	. .	12 16 43.20	+8.76					
44	Venus . . . S.F.	. .	. .	27.8	. .	. .	12 17 27.80	—8.28½	44.60	17.04½			
45	B. A. C. . . 5839	. .	. .	20.1	. .	. .	12 19 20.10	+9.12					
46	Venus . . . S.F.	. .	. .	4.6	. .	. .	12 20 4.60	—7.94	+44.50	—17.06			

JANUARY 14, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
47	B. A. C. . . 5839	. .	. .	41.6	. .	. .	12 21 41.60	+9.34			27.988	63.0	57.4
48	Venus . . . S.F.	. .	. .	26.8	. .	. .	12 22 26.80	—7.74	+45.20	—17.08			
49	B. A. C. . . 5839	. .	. .	5.0	. .	. .	12 24 5.00	+9.59			Ther. att. 70°.6 Bar red. to 32° F. 27.873		
50	Venus . . . S.F.	. .	. .	50.2	. .	. .	12 24 50.20	—7.42	45.20	17.01			
51	B. A. C. . . 5839	. .	. .	33.0	. .	. .	12 26 33.00	+9.94½					
52	Venus . . . S.F.	. .	. .	18.0	. .	. .	12 27 18.00	—7.06½	45.00	17.01			
53	B. A. C. . . 5839	. .	. .	26.5	. .	. .	12 29 26.50	+10 32					
54	Venus . . . S.F.	. .	. .	11.5	. .	. .	12 30 11.50	— 6.78½	45.00	17.10½			
55	B. A. C. . . 5839	. .	. .	23.5	. .	. .	12 33 23.50	+10.88					
56	Venus . . . S.F.	. .	. .	8.5	. .	. .	12 34 8.50	— 6.17	+45.00	—17.05			

Remarks.

A remarkably fine morning; clear, sharp images and good measures throughout, though rather more hurried than is desirable, on account of the distance through which the micrometer screw had to be moved.

a Not incorporated into the results. *b* Daylight.

Results.

	h. m. s.	s.	Rev.	′ ″
Mean . . Twenty-seven transits . .	11 58 7.39	+ 43.53	— 17.104	= 5 33.36

Correction for chronometer at 11 h. 58 m. . . . —47.42 s. Santiago sid. time S. F. . . . . 11 h. 57 m. 19.97 s.

Δ ρ at 11 h. 57 m. . . . . 0″.29

JANUARY 15, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	. .	. .	24.5	. .	. .	11 24 24.50	+9.61			27.918	65.5	59.0
2	H. C. . . . 31543	. .	. .	56.5	. .	. .	11 24 56.50	4.51	—32.00	+5.10			
3	Venus . . . S.F.	. .	. .	9.1	. .	. .	11 27 9.10	9.80			Ther. att. 70°.0 Bar. red. to 32° F. 27.805		
4	H. C. . . . 31543	. .	. .	40.6	. .	. .	11 27 40.60	4.70	31.50	5.10			
5	Venus . . . S.F.	. .	. .	6.4	. .	. .	11 29 6.40	10.27					
6	H. C. . . . 31543	. .	. .	38.0	. .	. .	11 29 38.00	5.14	31.60	5.13			
7	Venus . . . S F.	. .	. .	45.7	. .	. .	11 31 45.70	10.22					
8	H. C. . . . 31543	. .	. .	17.3	. .	. .	11 32 17.30	5.13	31.60	5.09			
9	Venus . . . S.F.	. .	. .	25.3	. .	. .	11 33 25.30	10.21					
10	H. C. . . . 31543	. .	. .	57.0	. .	. .	11 33 57.00	5.14	31.70	5.07			
11	Venus . . . S.F.	. .	. .	43.8	. .	. .	11 35 43.80	10.10					
12	H. C. . . . 31543	. .	. .	15.5	. .	. .	11 36 15.50	4.98	31.70	5.12			
13	Venus . . . S.F.	. .	. .	0.6	. .	. .	11 38 0.60	9.95					
14	H. C. . . . 31543	. .	. .	32.3	. .	. .	11 38 32.30	4.84	31.70	5.11			
15	Venus . . . S.F.	. .	. .	6.0	. .	. .	11 40 6.00	9.79					
16	H. C. . . . 31543	. .	. .	37.1	. .	. .	11 40 37.10	+4.72	—31.10	+5.07			

JANUARY 15, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
17	Venus . . . S.F.	. .	. .	9.0	. .	. .	11 42 9.00	+9.61½			27.918	65.5	59.0
18	H. C. . . . 31543	. .	. .	40.0	. .	. .	11 42 40.00	4.57	—31.00	+5.04½			
19	Venus . . . S.F.	. .	. .	13.9	. .	. .	11 44 13.90	9.50½			Ther. att. 70°.0		
20	H. C. . . . 31543	. .	. .	44.5	. .	. .	11 44 44.50	4.45	30.60	5.05½	Bar. red. to 32° F. 27.805		
21	Venus . . . S.F.	. .	. .	27.3	. .	. .	11 46 27.30	9.30½					
22	H. C. . . . 31543	. .	. .	58.0	. .	. .	11 46 58.00	4.33	30.70	4.97½			
23	Venus . . . S.F.	. .	. .	43.6	. .	. .	11 48 43.60	9.13					
24	H. C. . . . 31543	. .	. .	14.2	. .	. .	11 49 14.20	4.11	30.60	5.02			
25	Venus . . . S.F.	. .	. .	15.2	. .	. .	11 52 15.20	9.02					
26	H. C. . . . 31543	. .	. .	45.0	. .	. .	11 52 45.00	4.05½	29.80	4.96½			
27	Venus . . . S.F.	. .	. .	5.0	. .	. .	11 54 5.00	8.88½					
28	H. C. . . . 31543	. .	. .	35.1	. .	. .	11 54 35.10	3.82½	30.10	5.06			
29 a	Venus . . . S.F.	. .	. .	13.5	. .	. .	11 56 13.50	8.69					
30	H. C. . . . 31543	. .	. .	43.2	. .	. .	11 56 43.20	3.63½	29.70	5.05½			
31	Venus . . . S.F.	. .	. .	11.5	. .	. .	11 58 11.50	8.40					
32	H. C. . . . 31543	. .	. .	41.5	. .	. .	11 58 41.50	3.36½	30.00	5.03½			
33	Venus . . . S.F.	. .	. .	29.4	. .	. .	12 0 29.40	8.27½					
34	H. C. . . . 31543	. .	. .	58.9	. .	. .	12 0 58.90	3.22½	29.50	5.05			
35	Venus . . . S.F.	. .	. .	20.5	. .	. .	12 2 20.50	8.02					
36	H. C. . . . 31543	. .	. .	50.0	. .	. .	12 2 50.00	3.06½	29.50	4.95½			
37	Venus . . . S.F.	. .	. .	8.5	. .	. .	12 4 8.50	7.89½					
38	H. C. . . . 31543	. .	. .	37.6	. .	. .	12 4 37.60	2.93	29.10	4.96½			
39	Venus . . . S.F.	. .	. .	7.0	. .	. .	12 6 7.00	7.72½					
40	H. C. . . . 31543	. .	. .	36.5	. .	. .	12 6 36.50	2.77	29.50	4.95½			
41	Venus . . . S.F.	. .	. .	53.6	. .	. .	12 7 53.60	7.46					
42	H. C. . . . 31543	. .	. .	23.0	. .	. .	12 8 23.00	2.50	29.40	4.96			
43	Venus . . . S.F.	. .	. .	53.3	. .	. .	12 9 53.30	7.25½					
44	H. C. . . . 31543	. .	. .	22.6	. .	. .	12 10 22.60	2.26½	29.30	4.99			
45 b	Venus . . . S.F.	. .	. .	59.5	. .	. .	12 11 59.50	6.99½					
46	H. C. . . . 31543	. .	. .	28.3	. .	. .	12 12 28.30	2.00	28.80	4.99½			
47	Venus . . . S.F.	. .	. .	2.6	. .	. .	12 14 2.60	6.68					
48	H. C. . . . 31543	. .	. .	30.3	. .	. .	12 14 30.30	1.71½	27.70	4.96½			
49	Venus . . . S.F.	. .	. .	14.1	. .	. .	12 16 14.10	6.48					
50	H. C. . . . 31543	. .	. .	42.5	. .	. .	12 16 42.50	1.55½	28.40	4.92½			
51	Venus . . . S F.	. .	. .	3.8	. .	. .	12 18 3.80	6.28½					
52	H. C. . . . 31543	. .	. .	32.3	. .	. .	12 18 32.30	1.33	28.50	4.95½			
53	Venus . . . S.F.	. .	. .	53.0	. .	. .	12 19 53.00	6.11					
54	H. C. . . . 31543	. .	. .	21.5	. .	. .	12 20 21.50	1.15	28.50	4.96			
55	Venus . . . S.F.	. .	. .	1.3	. .	. .	12 22 1.30	5.79					
56	H. C. . . . 31543	. .	. .	30.0	. .	. .	12 22 30.00	0.86½	28.70	4.92½			
57	Venus . . . S.F.	. .	. .	59.3	. .	. .	12 23 59.30	5.55					
58	H. C. . . . 31543	. .	. .	27.5	. .	. .	12 24 27.50	0.56½	28.20	4.98½			
59	Venus . . . S.F.	. .	. .	53.0	. .	. .	12 25 53.00	5.41					
60	H. C. . . . 31543	. .	. .	20.8	. .	. .	12 26 20.80	+0.45	—27.80	+4.96			

JANUARY 15, 1851—Continued.

Remarks.

A fair morning only. Until the observation at 11*h.* 56*m.*, the planet was somewhat blurred and unsteady.
a Better defined and motion more uniform. *b* Daylight.

Results.

Mean . . Thirty transits . . . . h. m. s. 11 56 9.98	s. —29.94	Rev. +5.018	′ ″ =1 37.80
Correction for chronometer at h. m. 11 56	s. —48.26	Santiago sid. time S. F.	h. m. s. 11 55 21.72
Δ ρ at h. m. 11 56	″ 0.09		

JANUARY 16, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 31543	29.0	41.5	54.0	6.5	18.8	11 21 53.96	+9.03			27.918	64.4	56.5
2	Venus . . . S.F.	. .	46.2	58.6	11.0	23.5	11 22 58.60	8.35	+1 4.64	—0.68			
3	H. C. . . . 31543	51.2	4.0	. .	29.0	. .	11 25 16.35	8.75½			Ther. att. 69°.9 Bar. red. to 32° F. 27.805		
4	Venus . . . S.F.	56.5	9.0	21.5	34.0	46.3	11 26 21.46	8.12½	1 5.11	0.63			
5	H. C. . . . 31543	52.8	5.5	18.0	30.5	42.8	11 28 17.92	8.72½					
6	Venus . . . S.F.	. .	10.6	23.0	35.5	48.0	11 29 23.05	8.04½	1 5.13	0.68			
7	H. C. . . . 31543	36.5	49.0	1.3	13.8	26.3	11 31 1.38	8.70					
8	Venus . . . S.F.	41.6	54.0	6.8	19.2	31.5	11 32 6.62	7.94	1 5.24	0.76			
9	H. C. . . . 31543	51.2	3.8	16.2	28.6	41.0	11 34 16.16	8.46½					
10	Venus . . . S.F.	56.6	9.2	21.6	34.2	46.8	11 35 21.68	7.71	1 5.52	0.75½			
11	H. C. . . . 31543	40.0	52.6	5.0	17.5	30.0	11 37 5.02	8.28					
12	Venus . . . S.F.	45.5	58.5	10.5	23.2	35.5	11 38 10.64	7.53	1 5.62	0.75			
13	H. C. . . . 31543	57.5	10.3	22.5	35.0	47.5	11 40 22.56	8.05					
14	Venus . . . S.F.	. .	16.4	28.7	41.0	53.5	11 41 28.68	7.26½	1 6.12	0. 8½			
15	H. C. . . . 31543	57.5	10.0	22.5	35.0	47.4	11 43 22.48	7.83					
16	Venus . . . S.F.	3.5	16.3	28.6	41.0	53.5	11 44 28.58	7.04	1 6.10	0.79			
17	H. C. . . . 31543	2.8	15.5	27.5	40.3	52.8	11 46 27.78	7.47½					
18	Venus . . . S.F.	9.5	21.8	34.2	46.6	59.1	11 47 34.24	6.65½	1 6.46	0.82			
19	H. C. . . . 31543	18.7	31.2	43.5	56.0	8.5	11 49 43.58	7.27					
20	Venus . . . S.F.	25.2	37.7	50.2	2.5	15.2	11 50 50.16	6.40	1 6.58	0.87			
21	H. C. . . . 31543	36.0	48.0	0.5	13.0	25.3	11 53 0.56	6.93½					
22	Venus . . . S.F.	42.0	54.5	7.0	19.5	31.8	11 54 6.96	6.06½	1 6.40	0.87			
23	H. C. . . . 31543	18.5	30.7	43.1	55.5	8.0	11 59 43.16	6.27½					
24	Venus . . . S.F.	25.3	38.0	50.5	2.8	15.3	12 0 50.33	5.37½	1 7.22	0.90			
25	H. C. . . . 31543	38.5	51.0	3.5	15.8	28.1	12 3 3.38	5.73					
26	Venus . . . S.F.	45.8	58.5	10.8	23.2	35.6	12 4 10.78	4.85	1 7.40	0.88			
27	H. C. . . . 31543	33.4	46.0	58.3	10.6	23.2	12 5 58.30	5.51½					
28	Venus . . . S.F.	41.0	53.5	6.0	18.5	30.8	12 7 5.96	4.57	1 7.66	0.94½			
29	H. C. . . . 31543	37.0	49.8	2.0	14.5	27.0	12 9 2.06	5.12½					
30	Venus . . . S.F.	45.2	57.8	10.2	22.5	35.0	12 10 10.14	4.13	1 8.08	0.99½			
31	H. C. . . . 31543	36.0	48.8	1.1	13.5	26.0	12 12 1.08	4.79½					
32	Venus . . . S.F.	44.2	56.8	9.2	21.5	34.0	12 13 9.14	+3.85	+1 8.06	—0.94½			

JANUARY 16, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
33	H. C. . . . 31543	9.5	22.0	34.5	47.0	59.5	12 15 34.50	+4.39			27.918	64.4	56.5
34	Venus . . . S.F.	18.3	30.5	43.0	55.0	8.0	12 16 42.96	3.45½	+1 8.46	−0.93½			
35	H. C. . . . 31543	2.5	15.0	27.3	39.5	52.0	12 19 27.26	3.92½			Ther. att. 69°.9		
36	Venus . . . S.F.	11.0	23.3	35.8	48.2	0.6	12 20 35.78	2.92	1 8.52	1.00½	Bar. red. to 32° F. 27.805		
37	H. C. . . . 31543	54.6	7.2	19.7	32.2	44.6	12 22 19.66	3.58					
38	Venus . . . S.F.	3.7	16.3	28.6	41.0	53.5	12 23 28.62	2.57	1 8.96	1.01			
39	H. C. . . . 31543	1.0	13.5	26.0	38.5	51.0	12 25 26.00	3.09					
40	Venus . . . S.F.	10.3	22.6	35.0	47.5	0.0	12 26 35.08	2.03	1 9.08	1.06			
41	H. C. . . . 31543	31.5	44.0	56.5	9.0	21.3	12 28 56.46	2.78					
42	Venus . . . S.F.	42.0	55.0	7.5	19.8	32.2	12 30 7.30	1.80	1 10.84	0.98			
43	H. C. . . . 31543	15.3	27.7	40.0	52.5	4.8	12 32 40.06	2.24½					
44	Venus . . . S.F.	24.7	37.5	49.8	2.3	14.5	12 33 49.76	+1.21½	+1 9.70	−1.00			

Remarks.

Fine morning; good images and steady motion throughout.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . .	Twenty-two transits . . .	11 57 42.57	+ 1 7.13	—0.866	=0 16.88

Correction for chronometer at 11h 58m . . . — 48.66s

Santiago sid. time S. F. 11h 56m 53.91s

Δ ρ at 11h 56m . . . . 0.01″

JANUARY 17, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . 31543	22.5	35.0	47.3	0.0	12.5	11 23 47.46	+6.08			27.925	64.1	56.7
2	Venus . . . S.F.	11.5	24.3	36.5	49.0	1.5	11 26 36.56	—1.63½	+2 49.10	—7.71½			
3	H. C. . . . 31543	30.8	43.0	55.5	8.0	20.5	11 28 55.56	+5.77			Ther. att. 70°.5		
4	Venus . . S.F.	20.1	32.6	45.0	57.5	10.0	11 31 45.04	—1.95	2 49.48	7.72	Bar. red. to 32° F. 27.811		
5	H. C. . . . 31543	30.5	43.3	55.5	8.0	20.5	11 33 55.56	+5.51½					
6	Venus . . . S.F.	20.3	32.6	45.0	57.5	10.2	11 36 45.12	—2.26½	2 49.56	7.78			
7 a	H. C. . . . 31543	52.0	4.7	17.5	29.8	42.3	11 40 17.26	+5.21					
8	Venus . . . S.F.	42.6	55.0	7.5	20.0	32.5	11 43 7.52	—2.63	2 50.26	7.84			
9	H. C. . . . 31543	5.5	18.0	30.3	42.7	55.0	11 45 30.30	+4.67					
10	Venus . . . S.F.	55.8	8.5	20.8	33.2	45.5	11 48 20.76	—3.11½	2 50.46	7.78½			
11	H. C. . . . 31543	50.6	3.3	15.6	28.0	40.5	11 50 15.60	+4.33					
12	Venus . . . S F.	41.6	54.3	6.6	19.3	31.5	11 53 6.66	—3.53	2 51.06	7.86			
13	H. C. . . . 31543	41.5	54.0	6.5	19.0	31.5	11 55 6.50	+3.88					
14	Venus . . . S.F.	32.8	45.5	58.0	10.3	22.6	11 57 57.84	—4.02½	2 51.34	7.90½			
15	H. C. . . . 31543	39.5	52.0	4.5	16.5	29.3	12 1 4.36	+3.02					
16	Venus . . . S.F.	31.0	43.5	56.0	8.5	21.0	12 3 56.00	—4.90	+2 51.64	—7.92			

JANUARY 17, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
17	H. C. . . . 31543	56.0	8.5	21.0	33.2	45.7	12 6 20.88	+2.40			27.925	64.1	56.7
18	Venus . . . S.F.	48.0	0.5	13.0	25.5	38.0	12 9 13.00	—5.52½	+2 52.12	—7.92½			
19	H. C. . . . 31543	11.3	24.0	36.2	48.5	1.2	12 12 36.24	+5.44			Ther. att. 70°.5 Bar. red. to 32° F. 27.811		
20	Venus . . . S.F.	3.8	16.8	29.1	. .	53.7	12 15 28.94	—2.60	2 52.70	8.04			
21	H. C. . . . 31543	39.5	52.0	4.5	17.0	29.2	12 18 4.44	+4.17					
22	Venus . . . S.F.	31.5	. .	57.0	9.8	22.3	12 20 57.04	—3.92	2 52.60	8.09			
23 *b*	H. C. . . . 31543	11.0	23.5	36.0	48.5	1.0	12 23 36.00	+3.42					
24	Venus . . . S.F.	4.3	17.0	29.5	42.0	54.5	12 26 29.46	—4.63	2 53.46	8.05			
25	H. C. . . . 31543	30.7	43.0	55.5	8.0	20.5	12 28 55.54	+2.85					
26	Venus . . . S.F.	24.4	37.0	49.5	1.5	14.3	12 31 49.34	—5.23	2 53.80	8.08			
27	H. C. . . . 31543	13.8	23.0	38.5	51.0	3.2	12 34 38.50	+2.21½					
28	Venus . . . S.F.	7.5	20.0	32.5	45.0	57.5	12 37 32.50	—5.87	+2 54.00	—8.08½			

Remarks.

Somewhat hazy all the morning. Star dim and planet not sharp.

a Recorded 2.7*s*. at wire B. *b* Daylight.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . .	Fourteen transits . . .	12 1 38.98	+ 2 51.54	—7.914	= 2 34.20

Correction for chronometer at 12h 2m . . . . — 48.64s

Santiago sid. time S. F. 12h 0m 50.34s

Δ ρ at 12h 0m . . . . 0″.15

JANUARY 18, 1851.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Venus . . . S.F.	38.5	50.8	3.0	15.5	28.0	11 31 3.16	+14.90½			27.918	63.0	57.4
2	H. C. . . . 31791	. .	32.5	45.0	57.5	10.0	11 33 45.03	5.91	—2 41.87	+8.99½			
3 *a*	Venus . . . S.F.	44.5	56.8	9.5	22.0	34.3	11 36 9.42	14.64½			Ther. att. 68°.0 Bar. red. to 32° F. 27.801		
4	H. C. . . . 31791	26.2	38.5	51.0	3.5	16.0	11 38 51.04	5.66	2 41.62	8.98½			
5 *b*	Venus . . . S.F.	30.6	43.3	55.5	8.0	20.5	11 40 55.58	14.44½					
6	H. C. . . . 31791	. .	24.6	37.0	49.5	1.8	11 43 37.00	5.40½	2 41.42	9.04			
7	Venus . . . S.F.	20.8	33.5	46.0	58.3	10.8	11 45 45.88	14.10					
8	H. C. . . . 31791	. .	14.5	27.0	39.0	51.5	11 48 26.78	5.15½	2 40.90	8.94½			
9 *c*	Venus . . . S.F.	4.0	16.5	28.6	41.5	53.5	11 51 28.82	13.80½					
10	H. C. . . . 31791	44.5	57.3	9.5	22.0	34.5	11 54 9.56	4.77½	2 40.74	9.03			
11 *c*	Venus . . . S.F.	33.6	46.0	58.3	11.0	23.5	11 56 58.48	13.23					
12	H. C. . . . 31791	13.5	26.0	38.5	51.0	3.5	11 59 38.50	+4.30	—2 40.02	+8.93			

JANUARY 18, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
13 *b*	Venus . . . S.F.	23.3	35.8	48.3	0.8	13.2	12 1 48.28	+12.99			27.918	63.0	57.4
14	H. C. . . . 31791	3.0	15.5	28.0	40.5	53.0	12 4 28.00	4.03	—2 39.72	+8.96			
15 *d*	Venus . . . S.F.	37.5	50.3	2.6	15.2	27.6	12 7 2.64	12.31½			Ther. att. 68°.0		
16	H. C. . . . 31791	17.0	29.5	. .	54.5	. .	12 9 41.96	3.41	2 39.32	8.90½	Bar. red. to 32° F. 27.801		
17 *d*	Venus . . . S.F.	8.0	20.8	33.3	45.5	58.1	12 12 33.14	12.30					
18	H. C. . . . 31791	47.5	59.8	12.0	. .	36.8	12 15 12.11	3.48	2 38.97	8.82			
19	Venus . . . S.F.	53.0	5.5	17.8	30.3	42.8	12 17 17.88	11.90					
20	H. C. . . . 31791	31.3	43.8	56.5	9.0	21.0	12 19 56.32	+2.98	—2 38.44	+8.92			

Remarks.

No good measures, or rather no satisfactory measures, during the morning. Interrupted by fog. There is a neat double star of the 9th and 10th magnitudes preceding 31791 H. C., and south of it about 40″. This is doubtless 31784 H. C., which should have been observed instead of 31791 H. C.; the magnitudes having led to the error.

a Blurred. *b* Better. *c* Very much blurred. *d* Seen through fog.

Results.

Mean . . . Ten transits	h. m. s. 11 54 6.33	m. s. —2 40.30	Rev. + 8.953 . . . ′ ″ =2 54.50
Correction for chronometer at h. m. 11 54	s. —48.63	Santiago sid. time S. F.	h. m. s. 11 53 17.70
Δ ρ at h. m. 11 55	″ 0.18		

JANUARY 19, 1851.

The morning was cloudy.

JANUARY 20, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Venus . . . S.F.	5.5	18.3	30.8	43.3	55.8	11 19 30.74	+12.98½			27.990	63.0	57.4
2	H. C. . . . 31931	45.5	58.5	. .	23.5	36.0	11 22 10.86	15.79½	—2 40.12	—2.81			
3 *a*	Venus . . . S.F.	31.8	44.3	57.0	9.5	22.0	11 24 56.92	13.59			Ther. att. 66°.7		
4	H. C. . . . 31931	11.5	24.1	36.5	49.0	1.5	11 27 36.52	16.35	2 39.60	2.76	Bar. red. to 32° F. 27.887		
5	Venus . . . S.F.	21.2	33.8	46.2	58.5	11.1	11 29 46.16	13.95½					
6	H. C. . . . 31931	0.5	12.8	25.1	37.8	50.5	11 32 25.13	16.76	2 38.97	2.80½			
7 *b*	Venus . . . S.F.	3.7	16.5	28.8	41.3	53.5	11 34 28.76	13.96					
8	H. C. . . . 31931	43.0	55.5	7.8	20.1	32.5	11 37 7.78	16.83½	2 39.02	2.87½			
9	Venus . . . S.F.	52.5	5.2	17.5	30.0	42.5	11 39 17.54	13.92					
10	H. C. . . . 31931	31.0	43.5	56.0	8.5	21.0	11 41 56.00	16.76½	2 38.46	2.84½			
11	Venus . . . S.F.	20.8	33.5	46.0	58.5	11.0	11 43 45.96	13.62					
12	H. C. . . . 31931	59.2	11.5	24.0	36.5	49.0	11 46 24.04	+16.55	—2 38.08	—2.93			

JANUARY 20, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
13	Venus . . . S.F.	8.8	21.3	34.0	46.5	59.0	11 48 33.92	+13.33			27.990	63.0	57.4
14	H. C. . . . 31931	46.5	59.0	11.5	24.0	36.5	11 51 11.50	16.32	—2 37.58	—2.99			
15 c	Venus . . . S.F.	12.0	24.5	37.0	49.5	1.8	11 53 36.96	12.98			Ther. att. 66°.7		
16	H. C. . . . 31931	49.0	1.5	14.0	26.5	39.0	11 56 14.00	15.98	2 37.04	3.00	Bar. red. to 32° F. 27.887		
17	Venus . . . S.F.	59.1	11.8	24.0	36.5	48.8	11 58 24.04	12.56					
18	H. C. . . . 31931	35.8	48.2	0.8	13.0	25.5	12 1 0.66	15.60	2 36.62	3.04			
19 d	Venus . . . S.F.	47.3	59.5	12.0	24.5	37.2	12 4 12.10	11.95					
20	H. C. . . . 31931	23.5	36.0	48.5	1.0	13.3	12 6 48.46	15.06½	2 36.36	3.11½			
21	Venus . . . S.F.	50.8	3.5	15.7	28.2	40.8	12 9 15.80	11.43					
22	H. C. . . . 31931	26.5	39.0	51.3	4.0	16.5	12 11 51.46	14.59	2 35.66	3.16			
23	Venus . . . S.F.	34.3	46.8	59.5	11.8	24.3	12 13 59.34	10.80					
24	H. C. . . . 31931	10.0	22.3	34.6	47.0	59.5	12 16 34.68	14.03	2 35.34	3.23			
25	Venus . . . S.F.	13.5	26.0	38.5	51.0	3.3	12 18 38.46	10.30					
26	H. C. . . . 31931	48.5	1.0	13.0	25.5	38.0	12 21 13.20	13.53½	2 34.74	3.23½			
27	Venus . . . S.F.	59.5	12.0	24.5	36.8	49.2	12 23 24.40	9.63					
28	H. C. . . . 31931	34.0	46.5	58.8	11.1	23.5	12 25 58.78	12.89	2 34.38	3.26			
29	Venus . . . S.F.	0.8	13.5	25.7	38.0	50.5	12 28 25.70	9.00½					
30	H. C. . . . 31931	35.0	47.4	59.8	12.1	24.5	12 30 59.76	12.29	2 34.06	3.28½			
31 e	Venus . . . S.F.	10.3	22.5	35.0	47.5	59.8	12 33 35.02	8.40					
32	H. C. . . . 31931	43.5	56.0	8.5	21.0	33.5	12 36 8.50	11.74	2 33.48	3.34			
33	Venus . . . S.F.	9.0	21.6	34.0	46.5	59.0	12 40 34.02	7.50					
34	H. C. . . . 31931	41.5	54.5	7.0	19.5	31.5	12 43 6.80	10.90	2 32.78	3.40			
35	Venus . . . S.F.	35.5	48.3	0.5	13.0	25.4	12 45 0.54	7.02½					
36	H. C. . . . 31931	10.3	23.0	35.5	48.0	0.5	12 47 35.46	+10.47	—2 34.92	—3.44½			

Remarks.

Rarely a good measure during the whole morning, the motion of the planet being wavy.

a Blurred. *b* Better. *c* Tolerably sharp. *d* Sharp and good. *e* Daylight.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean . . .	Eighteen transits . . .	12 1 38.13	—2 36.51	—3.085	=1 0.13

Correction for chronometer at 12 h. 2 m. . . . —47.81 s. Santiago sid. time S. F. . . . . 12 h. 0 m. 50.32 s.

Δ ρ at 12 h. 2 m. . . . . 0.06″

JANUARY 21—23, 1851.

No attempt was made to measure the differences on the 21st, 22d, and 23d, the star being too distant in declination to move the micrometer screw through the space whilst the objects were passing across the field.

JANUARY 24, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	41.0	53.6	6.0	. .	31.0	11 48 5.99	+15.48½			27.886	64.6	58.5
2	Taylor . . . 8219	22.0	35.0	47.5	59.8	12.4	11 54 47.34	6.30	—6 41.35	+9.18½			
3	Venus . . . S.F.	43.3	55.6	8.1	20.6	33.0	11 57 8.12	14.74			Ther. att. 70°.5		
4	Taylor . . . 8219	. .	36.5	48.7	1.0	13.5	12 3 48.68	5.56½	6 40.56	9.17½	Bar. red to 32° F. 27.772		
5	Venus . . . S.F.	1.3	14.2	26.5	38.9	51.5	12 6 26.48	13.88					
6	Taylor . . . 8219	41.0	53.5	5.8	18.3	31.0	12 13 5.92	4.74	6 39.44	9.14			
7 *a*	Venus . . . S.F.	38.5	51.0	. .	15.5	28.2	12 15 3.25	12.86					
8	Taylor . . . 8219	16.8	29.5	41.8	54.0	6.5	12 21 41.72	3.88	6 38.47	8.98			
9	Venus . . . S.F.	47.5	0.0	12.5	24.5	37.3	12 24 12.36	11.88					
10	Taylor . . . 8219	25.0	37.5	50.0	2.5	15.0	12 30 50.00	2.91	6 37.64	8.97			
11 *b*	Venus . . . S.F.	41.2	54.0	6.5	18.6	31.2	12 33 6.30	10.71					
12	Taylor . . . 8219	18.0	30.8	43.0	55.5	8.0	12 39 43.06	1.87	6 36.76	8.84			
13	Venus . . . S.F.	29.5	42.2	54.5	7.0	19.5	12 41 54.54	9.56					
14	Taylor . . . 8219	5.5	18.0	30.3	42.5	55.3	12 48 30.32	0.79	6 35.78	8.77			
15 *c*	Venus . . . S.F.	20.3	32.8	45.2	57.6	10.0	12 50 45.18	+ 8.31½					
16	Taylor . . . 8219	55.0	7.5	20.0	32.5	45.0	12 57 20.00	— 0.35	6 34.82	8.66½			
17 *d*	Venus . . . S.F.	. .	44.2	56.5	9.0	21.5	12 59 56.56	+ 7.09½					
18	Taylor . . . 8219	12.5	25.0	37.5	50.0	2.7	13 6 37.54	— 1.55	—6 40.98	+8.64½			

Remarks.

Fine morning. Images good and motion equable. Cirri prevented earlier measures. There is a small star preceding the planet 4*s*. or 5*s*., which at the commencement, was recorded as below it.

a Very good measures.

b Planet's south limb and the preceding star precisely on the same parallel.

c Planet certainly south of the preceding star.

d Daylight. Rejected this pair.

Diameter of Venus from a mean of 10 measures, by daylight, at 13*h*. 15*m*. sid. time, 2.059 rev. Corrected diameter, 38″.00.

Results.

	h. m. s.	m. s.	Rev.	′ ″
Mean . . Eight transits	12 19 35.28	—6 38.10	+8.966	=2 54.75

Correction for chronometer at 12h. 20s. . . . . —49.50s.

Santiago sid. time S. F. . . . . 12h. 18m. 45.78s.

$\Delta\rho$ at 12h. 22m. . . . . 0″.14

JANUARY 25, 1851.

Cirri prevented the morning observations.

JANUARY 26, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	3.5	15.7	28.0	40.4	53.2	11 59 28.16	— 6.02½			27.942	61.7	56.3
2	H. C. . . . 32426	. .	40.0	52.5	4.5	17.5	12 0 52.38	+11.06½	—1 24.22	—17.09			
3	Venus . . . S.F.	31.0	43.7	56.0	8.5	21.2	12 3 56.08	— 6.33½			Ther. att. 66°.0 Bar. red. to 32° F. 27.831		
4	H. C. . . . 32426	. .	. .	20.5	32.5	45.0	12 5 20.20	+10.79	1 24.12	17.12½			
5	Venus . . . S.F.	23.8	41.5	49.0	1.3	13.6	12 7 48.84	— 6.70½					
6	H. C. . . . 32426	. .	0.0	12.5	25.0	37.2	12 9 12.43	+10.42½	1 23.59	17.13			
7	Venus . . . S.F.	27.3	39.6	52.3	4.6	17.5	12 11 52.26	— 7.19½					
8	H. C. . . . 32426	50.5	3.0	15.5	27.8	40.5	12 13 15.46	+10.03½	1 23.20	17.23			
9	Venus . . . S.F.	13.3	25.7	38.0	50.6	3.2	12 15 38.16	— 7.55					
10	H. C. . . . 32426	36.0	48.5	1.0	13.5	26.0	12 17 1.00	+ 9.61	1 22.84	17.16			
11	Venus . . . S.F.	27.5	40.0	52.5	5.0	17.5	12 19 52.50	— 8.03½					
12	H. C. . . . 32426	49.5	2.5	15.0	27.3	40.0	12 21 14.86	+ 9.17½	1 22.36	17.21			
13 *a*	Venus . . . S.F.	5.5	18.4	30.5	43.3	55.6	12 23 30.66	— 8.47½					
14	H. C. . . . 32426	27.5	40.0	52.5	5.0	17.5	12 24 52.50	+ 8.79½	1 21.84	17.27			
15	Venus . . . S.F.	55.6	8.0	20.5	33.0	45.5	12 27 20.52	— 8.96					
16	H. C. . . . 32426	17.0	29.5	42.0	54.6	7.0	12 28 42.02	+ 8.27½	1 21.50	17.23½			
17	Venus . . . S.F.	29.3	42.0	54.5	7.0	19.5	12 31 54.46	— 9.87					
18	H. C. . . . 32426	50.0	2.5	15.0	27.5	40.0	12 33 15.00	+ 7.55½	1 20.54	17.42½			
19	Venus . . . S.F.	. .	34.0	46.3	58.8	11.2	12 36 46.33	—10.39½					
20 *b*	H. C. . . . 32426	. .	54.3	6.8	19.2	31.6	12 38 6.73	+ 7.04	1 20.40	17.43½			
21	Venus . . . S.F.	10.6	23.4	36.0	48.3	0.6	12 40 35.78	—10.91					
22	H. C. . . . 32426	. .	43.5	56.0	8.5	21.0	12 41 56.01	+ 6.52	1 20.23	17.43			
23	Venus . . . S.F.	26.5	39.0	51.5	4.0	17.0	12 44 51.60	— 8.15					
24	H. C. . . . 32426	. .	58.7	11.2	23.5	36.0	12 46 11.11	+ 9.32	1 19.51	17.47			
25	Venus . . . S.F.	59.5	12.0	24.5	. .	49.5	12 48 24.47	— 8.93½					
26	H. C. . . . 32426	18.5	31.0	43.5	55.8	8.2	12 49 43.40	+ 8.56	1 18.93	17.49½			
27	Venus . . . S.F.	19.5	32.0	44.5	56.9	9.3	12 51 44.44	— 9.58					
28	H. C. . . . 32426	37.0	49.5	2.8	15.2	27.8	12 53 2.46	+ 8.01	1 18.02	17.59			
29 *c*	Venus . . . S.F.	. .	36.0	48.3	0.8	13.5	12 56 48.41	—10.17					
30	H. C. . . . 32426	. .	54.0	6.5	19.1	31.6	12 58 6.56	+ 7.45½	—1 18.15	—17.62½			

Remarks.

No very satisfactory observations were made during this morning. The planet was very much blurred and flaring at commencement, and later, when pretty sharp and well defined, had a wavy motion, which rendered measures questionable.

a Tolerably sharp. *b* Recorded 52.3*s*. at wire B. *c* Cirri.

Diameter of Venus from a mean of 10 measures at 13*h*. 10*m*. sid. time, 2.040 rev. Corrected diameter 37″.56.

Results.

		h. m. s.		m. s.		Rev.		′ ″
Mean . .	Fifteen transits	12 28 2.18		—1 21.30	. . . . .	—17.328	. . .	=5 37.72

Correction for chronometer at 12 28 h. m. . . . —50.21 s. Santiago sid. time S. F. . . . . 12 27 11.97 h. m. s.

Δ ρ at 12 28 h. m. . . . . 0.26 ″

JANUARY 27, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Venus . . . S.F.	18.8	31.3	43.8	56.3	8.8	12 2 43.80	+6.35			27.898	58.5	54.5
2	H. C. . . . 32706	35.0	47.5	0.0	12.0	25.0	12 8 59.90	—2.56	—6 16.10	+8.91			
3 *b*	Venus . . . S.F.	4.5	17.5	30.3	42.7	54.7	12 11 29.94	+5.44			Ther. att. 67°.4 Bar. red. to 32° F. 27.793		
4	H. C. . . . 32706	20.0	32.8	45.2	57.6	10.3	12 17 45.18	—3.38	6 15.24	8.82			
5 *c*	Venus . . . S.F.	19.5	32.0	44.5	57.0	9.5	12 19 44.50	+4.48					
6	H. C. . . . 32706	33.5	46.0	58.6	11.0	23.5	12 25 58.52	—4.22½	6 14.02	8.70½			
7 *d*	Venus . . . S.F.	56.8	9.2	21.8	34.3	46.8	12 28 21.78	+3.34					
8	H. C. . . . 32706	9.8	22.5	35.0	47.5	0.0	12 34 34.96	—5.25	6 13.18	8.59			
9 *d*	Venus . . . S.F.	56.3	8.8	21.3	33.7	46.3	12 37 21.28	+2.51					
10	H. C. . . . 32706	8.5	21.2	33.6	46.0	58.5	12 43 33.56	—6.03	6 12.28	8.54			
11	Venus . . . S.F.	17.8	30.5	42.8	55.5	8.0	12 45 42.92	+1.27					
12	H. C. . . . 32706	29.0	41.8	54.2	6.5	19.0	12 51 54.10	—7.12½	6 11.18	8.39½			
13	Venus . . . S.F.	. .	5.2	17.6	30.0	42.5	12 54 17.58	2.19½					
14	H. C. . . . 32706	2.5	15.5	28.0	40.4	52.9	13 0 27.86	10.54	6 10.28	8.34½			
15 *e*	Venus . . . S.F.	9.4	22.0	34.5	46.8	59.5	13 2 34.44	3.84½					
16 *f*	H. C. . . . 32706	18.5	31.0	43.5	56.0	8.5	13 8 43.50	—12.12	—6 9.06	+8.27½			

Remarks.

a Much blurred and unsteady.
b Better.
c Clean.
d Sharp and good measures.
e Beautiful.
f Micrometer recorded 11.12 rev.

Diameter of Venus at 13*h.* 15*m.* from a mean of 10 measures, 1.954 rev. Corrected diameter, 35″.83.

Results.

Mean . . . Eight transits	h. m. s. 12 32 47.03	m. s. — 6 12.67	Rev. + 8.572	′ ″ = 2 47.07
Correction for chronometer at h. m. 12 33	s. — 51.07	Santiago sid. time S. F.		h. m. s. 12 31 55.96
Δ ρ at h. m. 12 35	″ 0.13			

JANUARY 28, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	45.4	57.7	10.3	22.6	35.5	12 4 10.30	+5.87			28.043	62.2	55.6
2	H. C. . . . 32706	10.5	23.0	35.5	48.2	0.5	12 7 35.54	10.54½	—3 25.24	—4.67½			
3	Venus . . . S.F.	11.5	24.1	36.6	39.0	1.5	12 9 36.54	5.90			Ther. att. 68°.5 Bar. red. to 32° F. 27.935		
4	H. C. . . . 32706	36.0	48.5	1.0	13.5	26.0	12 13 1.00	10.66	3 24.46	4.76			
5	Venus . . . S.F.	28.5	41.2	53.6	6.0	18.8	12 14 53.62	5.43					
6	H. C. . . . 32706	52.5	5.0	17.5	30.6	42.5	12 18 17.62	10.25	3 24.00	4.82			
7	Venus . . . S.F.	58.5	11.0	23.5	36.0	48.5	12 20 23.50	4.97					
8	H. C. . . . 32706	21.5	34.2	46.5	59.0	11.9	12 23 46.62	+9.80½	—3 23.12	—4.83½			

JANUARY 28, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
9	Venus . . . S.F.	57.2	9.6	22.3	34.8	47.0	12 26 22.18	+4.27			28.043	62.2	55.6
10	H. C. . . . 32706	20.0	32.5	45.0	57.5	10.0	12 29 45.00	9.18½	—3 22.82	—4.91½			
11	Venus . . . S.F.	23.0	35.5	48.0	0.5	13.0	12 31 48.00	3.61½			Ther. att. 68°.5		
12	H. C. . . . 32706	45.0	57.5	10.0	22.4	35.0	12 35 9.98	8.57	3 21.98	4.95½	Bar. red. to 32° F. 27.935		
13	Venus . . . S.F.	0.5	13.0	25.5	38.0	50.3	12 37 25.46	2.93½					
14	H. C. . . . 32706	21.5	34.0	46.5	59.0	11.5	12 40 46.50	7.92	3 21.04	4.98½			
15 *a*	Venus . . . S.F.	21.5	34.0	46.5	59.0	11.5	12 42 46.50	2.28					
16	H. C. . . . 32706	42.0	54.5	7.0	19.5	32.0	12 46 7.00	7.27	3 20.50	4.99			
17	Venus . . . S.F.	33.4	46.0	58.5	11.0	23.5	12 47 58.48	1.56					
18	H. C. . . . 32706	53.5	6.0	18.5	30.5	43.5	12 51 18.40	6.58	3 19.92	5.02			
19	Venus . . . S.F.	2.0	14.6	27.2	39.8	52.3	12 53 27.18	0.73					
20	H. C. . . . 32706	21.0	34.0	46.3	58.8	11.5	12 56 46.32	5.83	3 19.14	5.10			
21	Venus . . . S.F.	58.5	11.3	23.6	36.0	48.7	12 59 23.62	7.24					
22	H. C. . . . 32706	17.5	30.0	42.5	55.0	7.5	13 2 42.50	12.38	3 18.88	5.14			
23 *b*	Venus . . . S.F.	11.3	24.0	36.5	49.0	1.5	13 5 36.40	5.39					
24	H. C. . . . 32706	35.5	. .	1.0	13.3	26.0	13 9 0.82	10.66½	3 24.42	5.27½			
25	Venus . . . S.F.	11.2	24.0	36.5	49.0	1.5	13 12 36.44	4.22					
26	H. C. . . . 32706	28.0	40.5	53.0	6.0	18.5	13 15 53.20	9.52½	3 16.76	5.30½			
27	Venus . . . S.F.	7.0	19.5	32.0	44.4	56.8	13 18 31.94	3.25					
28	H. C. . . . 32706	23.0	35.8	48.0	0.5	13.0	13 21 48.06	+8.64	—3 16.12	—5.39			

Remarks.

This has not proved a very good morning, as the planet was flaring, and the cusps never sharp.

a Measures a little close.

b There has evidently been a slip in the instrument, and this observation has been rejected.

Diameter of Venus from a mean of 10 measures at 13*h*. 30*m*. sid. time, 1.991 rev. Corrected diameter 36″.60.

Results.

Mean . . . Thirteen transits . . . 12h 38m 24.90s — 3m 21.07s . . . . —5.045 Rev. . . . . = 1′ 38.33″

Correction for chronometer at 12h 38m . . . —51.32s Santiago sid time S. F. 12h 37m 33.58s

Δ ρ at 12h 39m . . . . 0.07″

From the 29th of January to the 2d of February, both days included, it was cloudy at the hours for observing Venus.

FEBRUARY 4, 1851.

Also cloudy.

FEBRUARY 5, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1 a	Venus . . . S.F.	. .	. .	49.5	. .	. .	12 21 49.50	+12.93			28.065	60.9	56.7
2	H. C. . . . 33598	. .	. .	28.8	. .	. .	12 22 28.80	10.05	−39.30	+2.88			
3	Venus . . . S.F.	. .	. .	45.0	. .	. .	12 23 45.00	13.13½			Ther. att. 65°.4 Bar. red. to 32° F. 27.965		
4	H. C. . . . 33598	. .	. .	23.5	. .	. .	12 24 23.50	10.21½	38.50	2.92			
5	Venus . . . S.F.	. .	44.5	57.0	. .	. .	12 25 57.00	12.99½					
6	H. C. . . . 33598	. .	23.0	35.5	. .	. .	12 26 35.50	10.16	38.50	2.83½			
7	Venus . . . S.F.	. .	43.7	56.0	. .	. .	12 27 56.10	12.90					
8	H. C. . . . 33598	. .	22.0	34.5	. .	. .	12 28 34.50	10.11½	38.40	2.78½			
9 b	Venus . . . S.F.	. .	7.0	19.5	. .	. .	12 30 19.50	12.82					
10	H. C. . . . 33598	. .	45.0	57.5	. .	. .	12 30 57.50	9.96½	38.00	2.85½			
11	Venus . . . S.F.	. .	29.3	41.7	. .	. .	12 32 41.75	12.60½					
12	H. C. . . . 33598	. .	6.6	19.0	. .	. .	12 33 19.05	9.84	37.30	2.76½			
13	Venus . . . N.F.	. .	18.0	30.5	. .	. .	12 35 30.50	14.31½					
14	H. C. . . . 33598	. .	55.0	8.0	. .	. .	12 36 7.75	9.72	37.25	4.59½			
15 c	Venus . . . S.F.	. .	7.5	20.1	. .	. .	12 38 20.05	12.17½					
16	H. C. . . . 33598	. .	44.5	57.0	. .	. .	12 38 57.00	9.50½	36.95	2.67			
17	Venus . . . N.F.	. .	44.3	56.5	. .	. .	12 40 56.65	13.72					
18	H. C. . . . 33598	. .	20.5	33.0	. .	. .	12 41 33.00	9.20	36.35	4.52			
19 d	Venus . . . S.F.	. .	45.8	58.2	. .	. .	12 44 58.25	11.50½					
20	H. C. . . . 33598	. .	21.5	34.0	. .	. .	12 45 34.00	8.76	35.75	2.74½			
21	Venus . . . N.F.	. .	58.5	11.0	. .	. .	12 47 11.00	13.03½					
22	H. C. . . . 33598	. .	34.2	46.5	. .	. .	12 47 46.60	8.56½	35.60	4.47			
23	Venus . . . S.F.	. .	53.5	6.0	. .	. .	12 50 6.00	11.63					
24	H. C. . . . 33598	. .	28.5	41.0	. .	. .	12 50 41.00	9.00	35.00	2.63			
25	Venus . . . N.F.	. .	6.5	18.8	. .	. .	12 52 18.90	13.16½					
26	H. C. . . . 33598	. .	41.3	53.5	. .	. .	12 52 53.65	8.75	34.75	4.41½			
27	Venus . . . S.F.	. .	24.3	36.6	. .	. .	12 54 36.70	11.12					
28	H. C. . . . 33598	. .	58.8	11.2	. .	. .	12 55 11.25	8.49½	34.55	2.62½			
29	Venus . . . N.F.	. .	46.0	58.5	. .	. .	12 56 58.50	12.57					
30	H. C. . . . 33598	. .	20.1	32.5	. .	. .	12 57 32.55	8.18	34.05	4.39			
31 e	Venus . . . S.F.	. .	3.6	16.0	. .	. .	12 59 16.05	10.41½					
32	H. C. . . . 33598	. .	37.5	50.0	. .	. .	12 59 50.00	7.90	33.95	2.54½			
33	Venus . . . N.F.	. .	36.7	49.0	. .	. .	13 1 49.10	12.01					
34	H. C. . . . 33598	. .	10.5	22.5	. .	. .	13 2 22.75	7.63½	33.65	4.37½			
35 f	Venus . . . S.F.	. .	42.8	55.3	. .	. .	13 3 55.30	9.92					
36	H. C. . . . 33598	. .	16.0	28.2	. .	. .	13 4 28.35	7.40½	33.05	2.51½			
37	Venus . . . N.F.	. .	53.8	6.2	. .	. .	13 7 6.25	11.23½					
38	H. C. . . . 33598	. .	26.5	39.0	51.5	. .	13 7 39.00	6.93	32.75	4.30½			
39	Venus . . . S.F.	. .	46.0	58.5	. .	. .	13 9 58.50	9.06½					
40	H. C. . . . 33598	. .	18.0	30.5	. .	. .	13 10 30 50	6.61½	32.00	2.45			
41	Venus . . . N.F.	. .	9.5	21.8	. .	. .	13 12 21.90	10.46½					
42	H. C. . . . 33598	. .	41.5	53.8	6.2	. .	13 12 53.84	6.21	31.94	4.25½			
43	Venus . . . S.F.	. .	. .	37.5	. .	. .	13 15 37.50	8.32					
44	H. C. . . . 33598	. .	56.5	9.0	. .	. .	13 16 9.00	5.86	31.50	2.46			
45 g	Venus . . . N.F.	. .	51.8	4.5	. .	. .	13 18 4.40	9.76½					
46	H. C. . . . 33598	. .	23.7	36.3	. .	. .	13 18 36.25	+5.55½	−31.85	+4.21			

FEBRUARY 5, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ *a*.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
47	Venus . . . S.F.	. .	52.5	4.8	. .	. .	13 22 4.90	+7.64			28.065	60.9	56.7
48	H. C. . . . 33598	. .	23.0	35.0	. .	. .	13 22 35.25	5.27	—30.35	+2.37			
49 *g*	Venus . . . N.F.	. .	14.6	27.0	. .	. .	13 24 27.05	9.19			Ther. att. 65°.4		
50	H. C. . . . 33598	. .	44.6	57.0	. .	. .	13 24 57.05	5.00	30.00	4.19	Bar. red. to 32° F.		
51 *h*	Venus . . . S.F.	. .	12.4	24.9	. .	. .	13 28 24.90	6.97			27.965		
52	H. C. . . . 33598	. .	42.0	54.5	. .	. .	13 28 54.50	4.64	29.60	2.33			
53	Venus . . . N.F.	. .	34.5	46 8	. .	. .	13 31 46.90	7.97					
54	H. C. . . . 33598	. .	. .	16.0	. .	. .	13 32 16.00	3.80	29.10	4.17			
55 *h*	Venus . . . S.F.	. .	7.5	20.0	.	. .	13 35 20.00	5.58					
56	H. C. . . . 33598	. .	36.0	48.5	1.0	. .	13 35 48.50	3.35	28.50	2.23			
57	Venus . . . N.F.	. .	26.5	38.9	. .	. .	13 38 38.95	7.22½					
58	H. C. . . . 33598	. .	. .	7.0	19.5	. .	13 39 7.00	3.25	28.05	3.97½			
59	Venus . . . S.F.	. .	56.2	8.5	. .	. .	13 41 8.55	5.63					
60	H. C. . . . 33598	. .	. .	36.5	49.0	. .	13 41 36.50	3.35	27.95	2.28			
61	Venus . . . N.F.	. .	34.3	46.5	. .	. .	13 43 46.65	6.68					
62	H. C. . . . 33598	. .	. .	14.0	26.5	. .	13 44 14.00	2.74	27.35	3.94			
63	Venus . . . S.F.	. .	35.3	47.5	. .	. .	13 45 47.65	4.83					
64	H. C. . . . 33598	. .	. .	14.6	27.2	. .	13 46 14.65	2.61½	27.00	2.21½			
65	Venus . . . N.F.	. .	20.5	32.8	. .	. .	13 48 32.90	6.04½					
66	H. C. . . . 33598	. .	. .	59.6	12.0	. .	13 48 59.55	2.11	26.65	3.93½			
67	Venus . . . S.F.	. .	47.0	59.5	. .	. .	13 51 59.50	3.74					
68	H. C. . . . 33598	. .	. .	25.5	37.8	. .	13 52 25.40	1.60½	25.90	2.13½			
69	Venus . . . N.F.	. .	8.5	21.0	. .	. .	13 54 21.00	5.16					
70	H. C. . . . 33598	. .	. .	46.8	. .	. .	13 54 46.80	1.26½	25.80	3.89½			
71	Venus . . . S.F.	. .	34.5	47.0	. .	. .	13 56 47.00	2.98					
72	H. C. . . . 33598	. .	. .	12.8	25.0	. .	13 57 12.65	0.87	25.65	2.11			
73	Venus . . . N.F.	. .	39.8	52 2	. .	. .	14 0 52.25	4.08½					
74	H. C. . . . 33598	. .	. .	17.2	. .	. .	14 1 17.20	0.27	24.95	3.81½			
75	Venus . . . S.F.	. .	51.5	4.0	. .	. .	14 3 4.00	9.94			28.063	60.8	56.6
76	H. C. . . . 33598	. .	. .	28.5	41.0	. .	14 3 28.50	7.87	24.50	2.07			
77 *i*	Venus . . . N.F.	. .	58.8	11.0	. .	. .	14 5 11.15	10.24			Ther. att. 65°.0		
78	H. C. . . . 33598	. .	. .	35.3	47.8	. .	14 5 35.30	6.48	24.15	3.76	Bar. red. to 32° F.		
79	Venus . . . S F.	. .	6.3	18.5	. .	. .	14 7 18.65	8.29			27.965		
80	H. C. . . . 33598	. .	. .	42.5	55.0	. .	14 7 42.50	+6.27	—23.85	+2.02			

Remarks.

The early measures of this morning are not very good, both objects being blurred and unsteady.

a Much blurred and unsteady.
b A little better.
c Much blurred again.
d Alternately north and south limbs, commencing with the seventh differential measure.
e Pretty fair.
f Sharp.
g Good.
h Sharp and good.
i Daylight.

Diameter of Venus from a mean of 10 measures, at 14*h*. 15*m*. sid. time, 1.751 rev. Corrected diameter, 31''.93.

Results.

		h. m. s.	s.	Rev.	' ''
Mean S. F. . .	Twenty-three transits .	13 8 18.79	—32.44	+2.497 . . .	=0 48.67
Mean N. F. . .	Seventeen transits . .	13 19 59.65	—31.13	+4.189 . . .	=1 21.64

FEBRUARY 5, 1851—Continued.

Results—Continued.

	h. m.	s.
Correction for chronometer at	13 8	— 54.02
Correction for chronometer at	13 20	— 54.02

	h. m. s.
Santiago sid. time S. F.	13 7 24.77
Santiago sid. time N. F.	13 19 5.63
Interval	11 40.86

		″
Δ N. S. limbs micr. in rev.	1.692 =	32.97
Variation of declination in 11*m*. 41*s*.		+ 1.73
Corr. for diam. of micr. wires		— 2.20
Observed N. S. diameter		32.50

	h. m.	″
Δ ρ at	13 8	0.03
Δ ρ at	13 19	0.05

FEBRUARY 6, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1 *a*	Venus . . . S.F.	. .	. .	4.6	. .	. .	12 16 4.60	+15.22			28.025	65.0	59.2
2	H. C. . . . 33748	. .	. .	48.0	. .	. .	12 16 48.00	9.33	—43.40	+5.89			
3 *a*	Venus . . . N.F.	. .	7.5	20.2	. .	. .	12 18 20.10	17.01			Ther. att. 68°.3		
4	H. C. . . . 33748	. .	50.7	3.5	. .	. .	12 19 3.35	9.20	43.25	7.81	Bar. red. to 32° F.		
5 *a*	Venus . . . S.F.	. .	20.5	33.0	. .	. .	12 20 33.00	15.10			27.917		
6	H. C. . . . 33748	. .	3.2	15.6	. .	. .	12 21 15.65	9.22½	42.65	5.87½			
7 *a*	Venus . . . N.F.	. .	15.8	28.2	. .	. .	12 22 28.25	16.75					
8	H. C. . . . 33748	. .	58.2	10.7	. .	. .	12 23 10.70	8.99	42.45	7.76			
9	Venus . . . S.F.	. .	38.0	50.5	. .	. .	12 24 50.50	14.79					
10	H. C. . . . 33748	. .	19.8	32.5	. .	. .	12 25 32.40	8.87	41.90	5.92			
11 *b*	Venus . . . N.F.	. .	40.8	53.0	. .	. .	12 28 53.15	16.46					
12	H. C. . . . 33748	. .	22.4	. .	47.3	. .	12 29 31.85	8.68	41.70	7.78			
13	Venus . . . S.F.	. .	57.4	9.8	. .	. .	12 31 9.85	14.38					
14	H. C. . . . 33748	. .	38.5	51.0	. .	. .	12 31 51.00	8.62	41.15	5.76			
15	Venus . . . N.F.	. .	20.7	33.0	. .	. .	12 34 33.10	15.90½					
16	H. C. . . . 33748	. .	1.2	13.6	. .	. .	12 35 13.65	8.18	40.55	7.72½			
17	Venus . . . S.F.	. .	57.0	9.5	. .	. .	12 38 9.50	13.71					
18	H. C. . . . 33748	. .	37.0	49.5	. .	. .	12 38 49.50	7.97	40.00	5.74			
19 *c*	Venus . . . N.F.	. .	25.3	37.8	. .	. .	12 42 37.80	15.09					
20	H. C. . . . 33748	. .	5.0	17.5	. .	. .	12 43 17.50	7.55	39.70	7.54			
21	Venus . . . S.F.	. .	. .	29.8	. .	. .	12 45 29.80	12.86					
22	H. C. . . . 33748	. .	56.5	8.6	. .	. .	12 46 8.80	7.17	39.00	5.69			
23	Venus . . . N.F.	. .	8.4	20.8	. .	. .	12 51 20.85	14.20					
24	H. C. . . . 33748	. .	46.5	58.5	. .	. .	12 51 58.75	6.81	37.90	7.39			
25	Venus . . . S.F.	. .	35.7	48.0	. .	. .	12 53 48.10	12.05½					
26	H. C. . . . 33748	. .	13.5	26.0	. .	. .	12 54 26.00	6.45	37.90	5.60½			
27	Venus . . . N.F.	. .	0.2	12.6	. .	. .	12 56 12.65	13.57½					
28	H. C. . . . 33748	. .	37.8	50.0	. .	. .	12 56 50.15	6.18	37.50	7.39½			
29	Venus . . . S.F.	. .	52.0	4.5	. .	. .	13 0 4.50	11.34					
30	H. C. . . . 33748	. .	28.5	41.3	. .	. .	13 0 41.15	5.79	36.65	5.55			
31	Venus . . . N.F.	. .	25.2	37.6	. .	. .	13 2 37.65	12.80½					
32	H. C. . . . 33748	. .	1.5	14.3	. .	. .	13 3 14.15	5.49½	36.50	7.31			
33 *d*	Venus . . . S.F.	. .	54.5	7.0	. .	. .	13 5 7.00	10.74					
34	H. C. . . . 33748	. .	30.5	43.0	. .	. .	13 5 43.00	+5.10½	—36.00	+5.63½			

FEBRUARY 6, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
35	Venus . . . N.F.	. .	40.5	53.0	. .	. .	13 7 53.00	+11.99			28.025	65.0	59.2
36	H. C. . . . 33748	. .	16.5	28.8	. .	. .	13 8 28.80	4.69	−35.80	+7.30			
37	Venus . . . S.F.	. .	57.5	9.5	. .	. .	13 12 9.75	9 77			Ther. att. 68°.3		
38	H. C. . . . 33748	. .	32.5	44.8	. .	. .	13 12 44.90	4.24	35.15	5.53	Bar. red. to 32° F. 27.917		
39	Venus . . . N.F.	. .	53.2	5.5	. .	. .	13 14 5.60	11.13					
40	H. C. . . . 33748	. .	28.0	40.6	. .	. .	13 14 40.55	3.85	34.95	7.28			
41	Venus . . . S.F.	. .	9.3	21.6	. .	. .	13 16 21.70	8.89½					
42	H. C. . . . 33748	. .	. .	56.2	. .	. .	13 16 56.20	3.43½	34.50	5.46			
43	Venus . . . N.F.	. .	34.2	46.7	. .	. .	13 18 46.70	10.33½					
44	H. C. . . . 33748	. .	8.3	20.5	. .	. .	13 19 20.65	3.21	33.95	7.12½			
45	Venus . . . S.F.	. .	. .	24.6	. .	. .	13 21 24.60	8.39					
46	H. C. . . . 33748	. .	. .	58.5	. .	. .	13 21 58.50	2.96½	33.90	5.42½			
47	Venus . . . N.F.	. .	24.3	36.8	. .	. .	13 27 36.80	8.96½					
48	H. C. . . . 33748	. .	57.0	9.5	. .	. .	13 28 9.50	1.84	32.70	7.12½			
49	Venus . . . S.F.	. .	36.0	48.5	. .	. .	13 29 48.50	6.78					
50	H. C. . . . 33748	. .	8.5	21.0	. .	. .	13 30 21.00	1.45	32.50	5.33			
51	Venus . . . N.F.	. .	6.3	18.8	. .	. .	13 32 18.80	8.20					
52	H. C. . . . 33748	. .	38.5	50.8	. .	. .	13 32 50.90	1.06	32.10	7.14			
53	Venus . . . S.F.	. .	59.3	11.8	. .	. .	13 35 11.80	12.29½					
54	H. C. . . . 33748	. .	31.0	43.5	56.0	. .	13 35 43.50	7.07	31.70	5.22½			
55	Venus . . . N.F.	. .	35.3	47.5	. .	. .	13 39 47.65	12.40					
56	H. C. . . . 33748	. .	6.0	18.3	. .	. .	13 40 18.40	5.55½	30.75	6.84½			
57	Venus . . . S.F.	. .	33.5	46.0	. .	. .	13 41 46.00	10.49					
58	H. C. . . . 33748	. .	4.5	16.8	. .	. .	13 42 16.90	5.27	30.90	5.22			
59	Venus . . . N.F.	. .	32.2	44.5	. .	. .	13 43 44.60	11.93					
60	H. C. . . . 33748	. .	2.5	15.3	. .	. .	13 44 15.15	5.01	30.55	6.92			
61	Venus . . . S.F.	. .	1.5	13.9	. .	. .	13 45 13.95	9.89					
62	H. C. . . . 33748	. .	31.5	44.0	. .	. .	13 45 44.00	4.70½	30.05	5.18½			
63	Venus . . . N.F.	. .	1.0	13.5	. .	. .	13 47 13.50	11.56					
64	H. C. . . . 33748	. .	31.0	43.5	56.0	. .	13 47 43.50	4.69½	30.00	6.86½			
65	Venus . . . S.F.	. .	59.5	11.9	. .	. .	13 51 11.95	8.92½					
66	H. C. . . . 33748	. .	29.0	41.5	. .	. .	13 51 41.50	3.76	29.55	5.16½			
67	Venus . . . N.F.	. .	27.9	40.3	. .	. .	13 53 40.35	10.48					
68	H. C. . . . 33748	. .	57.0	9.2	. .	. .	13 54 9.35	3.61	29.00	6.87			
69	Venus . . . S.F.	. .	27.2	39.7	. .	. .	13 55 39.70	8.71					
70 e	H. C. . . . 33748	. .	56.0	8.6	. .	. .	13 56 8.55	3.59	28.85	5.12			
71	Venus . . . N.F.	. .	23.5	35.8	. .	. .	13 57 35.90	9.65					
72	H. C. . . . 33748	. .	52.0	4.5	. .	. .	13 58 4.50	2.96	28.60	6.69			
73	Venus . . . S.F.	. .	57.3	9.8	. .	. .	14 2 9.80	7.20					
74	H. C. . . . 33748	. .	. .	37.5	. .	. .	14 2 37.50	2.12	27.70	5.08			
75 f	Venus . . . N.F.	. .	2.3	14.8	. .	. .	14 4 14.80	8.89					
76	H. C. . . . 33748	. .	. .	42 5	. .	. .	14 4 42.50	2.13	27.70	6.76			
77	Venus . . . S.F.	. .	59.0	11.5	. .	. .	14 6 11.50	6.54					
78	H. C. . . . 33748	. .	. .	38.8	. .	. .	14 6 38.80	1.47½	27.30	5.06½			
79	Venus . . . N.F.	. .	. .	21.0	. .	. .	14 8 21.00	8.29½					
80	H. C. . . . 33748	. .	. .	48.0	. .	. .	14 8 48.00	+1.47	−27.00	+6.82½			

FEBRUARY 6, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
81	Venus . . . S.F.	. .	. .	58.3	. .	. .	14 9 58.30	+6.25			28.030	63.4	58.5
82	H. C. . . . 33748	. .	. .	25.5	. .	. .	14 10 25.50	1.24	—27.20	+5.01			
83	Venus . . . N.F.	. .	24.8	37.3	. .	. .	14 11 37.30	7.77			Ther. att. 66°.6 Bar. red. to 32° F. 27.927		
84 *g*	H. C. . . . 33748	. .	51.5	4.0	. .	. .	14 12 4.00	0.94	26.70	6.83			
85	Venus . . . S.F.	. .	. .	39.8	. .	. .	14 13 39.80	5.63					
86 *h*	H. C. . . . 33748	. .	. .	6.5	. .	. .	14 14 6.50	0.59½	26.70	5.03½			
87	Venus . . . N.F.	. .	16.0	28.6	. .	. .	14 15 28.55	7.13					
88	H. C. . . . 33748	. .	42.0	54.6	. .	. .	14 15 54.55	0.35	26.00	6.78			
89	Venus . . . S.F.	. .	10.7	23.0	. .	. .	14 17 23.10	11.69					
90	H. C. . . . 33748	. .	. .	49.0	1.5	. .	14 17 49.00	6.73½	25.90	4.95½			
91	Venus . . . N.F.	. .	11.0	23.4	. .	. .	14 19 23.45	13.30					
92	H. C. . . . 33748	. .	. .	48.5	1.0	. .	14 20 48.50	6.55½	25.05	6.74½			
93	Venus . . . S.F.	. .	. .	10.5	. .	. .	14 22 10.50	11.65½					
94	H. C. . . . 33748	. .	. .	36.0	. .	. .	14 22 36.00	6.69	25.50	4.96½			
95	Venus . . . N.F.	. .	. .	55.0	. .	. .	14 23 55.00	13.13					
96	H. C. . . . 33748	. .	. .	19.5	. .	. .	14 24 19.50	6.47	24.50	6.66			
97	Venus . . . S.F.	. .	23.6	36.0	. .	. .	14 25 36.05	11.62½					
98	H. C. . . . 33748	. .	. .	0.5	13.5	. .	14 26 0.75	6.68	24.70	4.94½			
99	Venus . . . N.F.	. .	. .	18.5	30.8	. .	14 28 18.40	13.33½					
100 *i*	H. C. . . . 33748	. .	. .	43.0	55.0	. .	14 28 42.75	+6.75	—24.35	+6.58½			

Remarks.

The morning was extremely fine from 13*h*. 10*m*.; and as the images were distinct and the motion steady, all the measures made after that time may be considered good.

a Blurred and unsteady.
b Tolerably sharp.
c Sharp and good.
d Very sharp.
e Recorded 9.6*s*. at wire C.
f Daylight measures.
g Recorded 3.0*s*. at wire C.
h Recorded 7.5*s*. at wire C.
i Recorded 53.0*s*. and 5.0*s*. at wires C and D.

Diameter of the planet from a mean of 10 measures, at 14*h*. 32*m*. sid. time, 1.704 rev. Corrected diameter, 31″.01.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F. . .	Twenty-five transits . .	13 26 26.95	—33.23	+5.379	=1 44.84
Mean N. F. . .	Twenty-five transits . .	13 30 50.60	—32.77	+7.122	=2 18.81

h. m.	s.
Correction for chronometer at 13 26	—54.05
Correction for chronometer at 13 31	—54.05

	h. m. s.
Santiago sid. time for S. F.	13 25 32.90
Santiago sid. time for N. F.	13 29 56.55
Interval	4 23.65

	″
Δ N. S. limbs micr. in rev.	1.743=33.97
Variation of declination in 4*m*. 24*s*. . .	+ 0.63
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	32.40

h. m.	″
Δ ρ at 13 26	0.06
Δ ρ at 13 30	0.07

FEBRUARY 7, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 33748	39.5	52.0	5.0	17.0	29.5	12 15 4.60	+15.70			28.030	66.4	59.2
2 *a*	Venus . . . S.F.	28.2	40.5	53.2	6.0	18.5	12 17 53.28	11.55	+2 48.68	−4.15			
3	H. C. . . . 33748	47.6	0.5	13.0	25.5	38.0	12 20 12.92	15.57½			Ther. att 70°3.		
4	Venus . . . N.F.	37.0	49.5	2.5	15 0	27.5	12 23 2.30	13.15	2 49.38	2.42½	Bar. red. to 32° F. 27.916		
5	H. C. . . . 33748	58.2	10.5	23.2	35.8	48.5	12 28 23.21	15.18					
6 *b*	Venus . . . S.F.	48.8	1.5	14.0	26.5	39.5	12 31 14.06	10.96	2 50.82	4.22			
7	H. C. . . . 33748	45.2	58.0	10.2	23.0	35.5	12 33 10.38	15.03					
8	Venus . . . N.F.	36.5	49.0	1.6	14.3	26.8	12 36 1.64	12.47	2 51.26	2.56			
9	H. C. . . . 33748	43.2	55.6	8.1	20.6	33.5	12 38 8.20	14.55½					
10	Venus . . . S.F.	35.4	47.8	0.4	12.7	25.5	12 41 0.36	10.26	2 52.16	4.29½			
11	H. C. . . . 33748	31.2	44.0	56.5	9.0	21.7	12 42 56.48	14.13					
12	Venus . . . N.F.	24.0	36.5	49.2	1.8	14.5	12 45 49.20	11.50	2 52.72	2.63			
13	H. C. . . . 33748	19.5	32.0	44.5	57.0	9.5	12 47 44.50	13.68					
14 *c*	Venus . . . S.F.	13.0	25.5	38.0	50.5	3.5	12 50 38.10	9.25	2 53.60	4.43			
15	H. C. . . . 33748	2.5	15.0	27.5	40.5	53.0	12 53 27.70	13.08½					
16	Venus . . . N.F.	57.0	9.5	22.5	34.8	47.5	12 56 22.26	10.33½	2 54.56	2.75			
17	H. C. . . . 33748	49.0	1.5	14.1	26.6	39.2	12 58 14.08	12.51½					
18	Venus . . . S.F.	44.0	56.8	9.2	21.5	34.5	13 1 9.20	8.05	2 55.12	4.46½			
19	H. C. . . . 33748	17.5	30.0	42.3	54.6	7.5	13 3 42.38	11.81½					
20	Venus . . . N.F.	13.2	25.7	38.3	50.6	3.5	13 6 38.26	9.09	2 55.88	2.72½			
21	H. C. . . . 33748	41.5	54.5	7.0	19.5	32.0	13 9 6.90	11.12½					
22	Venus . . . S.F.	38.5	51.2	3.7	16.3	28.6	13 12 3.66	6.63½	2 56.76	4.49			
23	H. C. . . . 33748	3.5	16.0	28.5	41.0	53.5	13 14 28.50	10.40					
24	Venus . . . N.F.	0.5	13.5	25.9	38.5	51.0	13 17 25.88	7.52½	2 57.38	2.87½			
25	H. C. . . . 33748	21.0	33.5	46.0	58.5	11.0	13 19 46.00	9.76½					
26	Venus . . . S.F.	19.3	32.0	44.5	56.8	9.3	13 22 44.38	5.19½	2 58.38	4.57			
27	H. C. . . . 33748	51.0	3.5	16.0	28.5	41.0	13 25 16.00	9.25					
28	Venus . . . N.F.	50.2	2.5	15.1	27.7	40.3	13 28 15.16	6.30	2 59.16	2.95			
29	H. C. . . . 33748	34.6	47.0	59.5	12.0	24.5	13 30 59.52	8.23½					
30	Venus . . . S.F.	34.0	46.5	59.0	11.5	24.5	13 33 59.10	3.55	2 59.58	4.68½			
31	H. C. . . . 33748	44.2	57.0	9.5	22.0	34.5	13 36 9.44	7.64					
32	Venus . . . N.F.	45.3	. .	10.5	23.0	35.0	13 39 10.31	4.55	3 0.87	3.09			
33	H. C. . . . 33748	51.5	4.5	17.0	29.8	42.2	13 43 17.00	6.41					
34	Venus . . . S.F.	53.5	6.5	19.0	31.5	44.0	13 46 18.90	1.63½	3 1.90	4.77½			
35	H. C. . . . 33748	. .	20.6	33.1	45.5	58.3	13 48 33.10	5.60					
36	Venus . . . N.F.	10.5	23.0	35.5	48.0	0.5	13 51 35.50	2.50½	3 2.40	3.09½			
37	H. C. . . . 33748	52.5	5.2	. .	30.0	42.5	13 55 17.50	13.17½					
38	Venus . . . S.F.	56.0	8.5	21.0	33.5	46.2	13 58 21.04	8.32½	3 3.54	4.85			
39	H. C . . . 33748	2.0	15.0	27.3	39.8	52.5	14 0 27.32	12.37½					
40	Venus . . . N.F.	6.4	19.0	31.5	44.0	56.5	14 3 31.48	9.16	3 4.16	3.21½			
41 *d*	H. C. . . . 33748	29.0	41.5	54.0	6.5	19.0	14 5 54.00	11.40½			28.030	65.0	58.5
42	Venus . . . S.F.	34.0	. .	59.0	11.5	24.3	14 8 59.06	6.49	3 5.06	4.91½			
43	H. C. . . . 33748	58.5	11.0	23.3	35.8	48.2	14 11 23.36	10.56			Ther. att. 68°.8		
44	Venus . . . N.F.	3.8	16.7	29.0	41.5	54.3	14 14 29.06	7 29	3 5.70	3.27	Bar. red. to 32° F. 27.921		
45	H. C. . . . 33748	. .	4.2	16.7	29.0	41.5	14 16 16.58	10.12½					
46	Venus . . . S.F.	58.0	10.5	23.0	35.5	48.2	14 19 23.01	+ 5.11½	+3 6.46	−5.01			

FEBRUARY 7, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
47	H. C. . . . 33748	. .	4.3	17.0	29.3	41.6	14 21 16.91	+ 9.03			28.030	65.0	58.5
48	Venus . . . N.F.	58.6	11.5	24.0	36.5	49.0	14 24 23.92	+ 5.66½	+3 7.01	−3.36½			

Remarks.

There could not well have been a finer morning, and there were clean images and good measures without exception.

a Somewhat blurred and unsteady.
b Sharp and steady.
c Motion wavy.
d Daylight measures.

Diameter of the planet from a mean of 10 measures, at 14*h.* 30*m.* sid. time, 1.725 rev. Corrected diameter, 31″.43.

Results.

		h. m. s.
Mean S. F. . .	Twelve transits . . .	13 18 38.68
Mean N. F. . .	Twelve transits . . .	13 24 40.41

	m. s.	Rev.	′ ″
S. F.	+2 57.67	−4.571 . . .	= 1 29.09
N. F.	+2 58.37	−2.913 . . .	= 0 56.78

h. m.	s.
Correction for chronometer at 13 19	−53.43
Correction for chronometer at 13 25	−53.43

	h. m. s.
Santiago sid. time S. F.	13 17 45.25
Santiago sid. time N. F.	13 23 46.98
Interval	6 1.73

	″
Δ N. S. limbs micr. in rev.	1.658 = 32.31
Variation of declination in 6*m.* 2*s.* . .	+ 0.78
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	30.89

h. m.	″
Δ ρ at 13 17	0.06
Δ ρ at 13 23	0.03

FEBRUARY 10, 1851.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Taylor . . . 8533	9.5	22.0	34.5	47.5	59.8	12 32 34.66	+16.95			28.032	58.9	53.4
2	Venus . . . S.F.	49.5	2.3	14.8	27.4	39.8	12 35 14.76	15.51½	+2 40 10	−1.43½			
3 *a*	Taylor . . . 8533	52.5	5.3	17.5	30.3	42.5	12 37 17.62	16.84½			Ther. att. 65°.9		
4	Venus . . . N.F.	33.5	46.1	58.6	11.2	24.0	12 39 58.68	17.09	2 41.06	+0.15½	Bar. red. to 32° F. 27.921		
5	Taylor . . . 8533	3.5	16.5	29.0	41.5	54.0	12 42 28.90	16.45½					
6	Venus . . . S.F.	. .	. .	10.5	23.2	35.6	12 45 10.56	14.94	2 41.66	−1.51½			
7	Taylor . . . 8533	9.0	21.6	34.1	46.5	59.5	12 47 34.14	16.03					
8	Venus . . . N.F.	51.5	4.0	16.5	29.2	41.6	12 50 16.56	16.18	2 42.42	+0.12			
9	Taylor . . . 8533	47.5	0.3	13.2	25.6	38.1	12 53 12.94	16.55½					
10	Venus . . . S.F.	31.0	43.8	56.2	8.8	21.4	12 55 56.24	14.90½	2 43.30	−1.65			
11	Taylor . . . 8533	8.8	21.5	34.0	46.6	59.5	12 58 34.08	14.96					
12	Venus . . . N.F.	53.0	5.5	18.5	30.5	43.5	13 1 18.20	15.04½	2 44.12	+0.08½			
13	Taylor . . . 8533	56.0	8.5	21.0	33.5	46.0	13 4 21.00	14.37					
14	Venus . . . S.F.	40.8	53.3	6.0	18.5	31.0	13 7 5.92	12.66	2 44.92	−1.71			
15 *b*	Taylor . . . 8533	48.5	1.5	14.0	26.5	39.2	13 9 13.94	13.46½					
16	Venus . . . N.F.	34.5	47.0	59.5	12.5	25.0	13 11 59.70	13.36	2 45.76	0.10½			
17	Taylor . . . 8533	24.7	37.5	49.8	2.5	15.0	13 14 49.90	12.70					
18	Venus . . . S.F.	11.3	24.0	. .	49.0	1.5	13 17 36.39	10.96½	2 46.49	1.73½			
19	Taylor . . . 8533	38.0	50.8	3.5	16.0	28.4	13 23 3.34	11.76½					
20	Venus . . . N.F.	26.0	. .	51.0	3.5	16.2	13 25 51.03	+11.67½	+2 47.69	−0.09			

FEBRUARY 10, 1851—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
21	Taylor . . . 8533	59.0	11.5	24.0	36.5	49.5	13 28 24.10	+11.03			28.019	56.2	52.5
22	Venus . . . S.F.	47.5	0.5	13.0	25.2	38.0	13 31 12.84	9.21½	+2 48.74	−1.81½			
23 *c*	Taylor . . . 8533	12.5	25.1	37.7	50.3	2.5	13 35 37.62	10.41			Ther. att. 64°.5 Bar. red. to 32° F. 27.923		
24	Venus . . . N.F.	2.5	15.3	27.6	40.3	52.5	13 38 27.64	10.22	2 50.02	0.19			
25	Taylor . . . 8533	28.5	41.0	53.5	6.0	18.5	13 40 53.50	9.64½					
26	Venus . . . S.F.	19.0	31.5	44.0	56.6	9.3	13 43 44.08	7.76	2 50.58	1.88½			
27	Taylor . . . 8533	56.5	9.3	21.5	34.0	46.5	13 46 21.56	8.79½					
28	Venus . . . N.F.	48.0	0.5	13.2	25.6	38.0	13 49 13.06	8.56	2 51.50	0.23½			
29	Taylor . . . 8533	54.0	6.5	19.3	31.5	44.0	13 51 19.06	8.09½					
30	Venus . . . S.F.	46.3	59.0	11.5	23.7	36.5	13 54 11.40	6.18	2 52.34	1.91½			
31	Taylor . . . 8533	28.0	40.7	53.1	5.6	18.3	13 56 53.14	7.33					
32	Venus . . . N.F.	21.0	33.5	46.0	58.6	11.2	13 59 46.06	7.06	2 52.92	0.27			
33	Taylor . . . 8533	19.8	32.5	45.0	57.5	10.0	14 1 44.96	6.60½					
34	Venus . . . S.F.	13.5	26.5	39.0	51.3	3.8	14 4 38.82	4.62	2 53.86	1.98½			
35	Taylor . . . 8533	9.0	21.5	34.3	46.8	59.3	14 6 34.18	5.92½					
36	Venus . . . N.F.	. .	16.5	29.0	41.5	54.0	14 9 28.97	5.53½	2 54.79	0.39			
37	Taylor . . . 8533	3.2	15.5	28.1	40.6	53.0	14 11 28.08	5.21					
38	Venus . . . S.F.	58.4	10 7	23.5	36.0	48.5	14 14 23.42	3.15	2 55.34	2.06			
39	Taylor . . . 8533	1.0	13.8	26.1	38.6	51.2	14 16 26.14	4.47½					
40	Venus . . . N.F.	57.0	9.5	22.3	34.6	47.3	14 19 22.08	4.00½	2 55.94	0.47			
41 *d*	Taylor . . . 8533	2.0	14.5	26.8	39.5	51.8	14 22 26.92	3.55					
42	Venus . . . S.F.	58.5	11.2	24.0	36.5	48.8	14 25 23.80	1.42	2 56.88	2.13			
43	Taylor . . . 8533	51.3	4.8	16.5	29.0	41.5	14 27 16.62	2.74					
44	Venus . . . N.F.	49.0	1.5	14.3	26.6	39.2	14 30 14.12	2.31½	2 57.50	0.42½			
45	Taylor . . . 8533	59.5	12.0	24.6	37.1	49.8	14 32 24.60	8.48					
46	Venus . . . S.F.	58.2	10.7	23.2	35.7	48.3	14 35 23.22	6.30	2 58.62	2.18			
47	Taylor . . . 8533	36.8	. .	2.0	14.6	27.0	14 37 1.96	7.86					
48	Venus . . . N.F.	36.0	48.5	1.2	13.6	26.3	14 40 1.12	+7.28	+2 59.16	−0.58			

Remarks.

The first part of the morning was only fair, but the last thirteen measures have been good.

a Blurred and unsteady. *c* Good.

b Tolerably sharp and good. *d* Daylight measures.

Diameter of Venus from a mean of 10 measures, at 14*h.* 49*m.* sid. time, 1.626 rev. Corrected diameter, 29″.49.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . .	Twelve transits . . .	13 35 50.12	−2 49.40	−1.834	= 0 35.75
Mean N. F. . .	Twelve transits . . .	13 46 19.77	−2 50.24	−0.199	= 0 3.89

	h. m.	s.
Correction for chronometer at 13 36	. .	−51.66
Correction for chronometer at 13 46	. .	−51.66

	h. m. s.
Santiago sid. time S. F.	13 34 58.46
Santiago sid. time N. F.	13 45 28.11
Interval	10 29.65

		″
Δ N. S. limbs micr. in rev.	1.635 =	31.86
Variation of declination in 10*m.* 30*s.*		+ 1.03
Corr. for diam. of micr. wires		− 2.20
Observed N. S. diameter		30.69

h. m.	″
Δ ρ at 13 31	0.02
Δ ρ at 13 41	0.00

INFERIOR CONJUNCTION OF VENUS: 1852.

MAY 30, 1852.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	339	. .	40.5	53.0	. .	. .	10 50 53.19	—3.26			27.916	56.3	50.3
2	Venus . . .	N.P.	42.1	55.0	8.0	21.0	34.0	10 52 8.02	+6.64½	+1 14.83	+9.90½			
3	Bessel . . .	339	48.0	0.5	13.5	26.5	. .	10 57 13.57	—4.13½			Ther. att. 60°.2 Bar. red. to 32° F. 27.833		
4	Venus . . .	S.P.	3.5	16.5	29.5	42.0	55.5	10 58 29.40	+6.85	1 15.83	10.98½			
5	Bessel . . .	339	44.8	58.0	10.6	23.6	. .	11 1 10.70	—4.48					
6	Venus . . .	N.P.	1.5	14.5	. .	40.2	53.5	11 2 27.42	+5.70½	1 16.72	10.18½			
7	Bessel . . .	339	. .	. .	6.8	. .	. .	11 6 6.78	—5.06½					
8	Venus . . .	S.P.	. .	. .	24.1	. .	. .	11 7 24.08	+6.84	1 17.30	11.90½			
9	Bessel . . .	339	. .	. .	56.3	. .	. .	11 9 56.28	—5.55					
10	Venus . . .	N.P.	. .	. .	14.0	. .	. .	11 11 13.98	+4.90	1 17.70	10.45			
11	Bessel . . .	339	. .	. .	34.0	. .	. .	11 13 33.98	—5.95					
12	Venus . . .	S.P.	. .	. .	52.2	. .	. .	11 14 52.18	+6.29	1 18.20	12.24			
13	Bessel . . .	339	. .	. .	0.8	. .	. .	11 17 0.78	—6.29					
14	Venus . . .	N.P.	. .	. .	19.5	. .	. .	11 18 19.48	+4.37	1 18.70	10.66			
15	Bessel . . .	339	. .	. .	6.5	. .	. .	11 21 6.48	—6.61					
16	Venus . . .	S.P.	. .	. .	25.5	. .	. .	11 22 25.48	+5.75	1 19.00	12.36			
17	Bessel . . .	339	. .	. .	41.7	. .	. .	11 24 41.68	—7.01½					
18	Venus . . .	N.P.	. .	. .	1.5	. .	. .	11 26 1.48	+3.84½	1 19.80	10.86			
19	Bessel . . .	339	. .	. .	55.8	. .	. .	11 27 55.78	—7.16½					
20	Venus . . .	S.P.	. .	. .	15.7	. .	. .	11 29 15.68	+5.39½	+1 19.90	+12.56			

Remarks.

There never was a sharp image. The star does not agree well with the Ephemeris; but there is no other anything like so bright, and this certainly is not more than an 8th magnitude.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Five transits . . .	11 10 2.08	+1 17.55	+10.412	=3 22.93
Mean S. P. . . .	Five transits . . .	11 14 29.36	+1 18.05	+12.010	=3 54.07

	s.
Correction for chronometer at 11 h. 10 m. . . .	—45.34
Correction for chronometer at 11 14 . . .	—45.34

	h. m. s.
Santiago sid. time N. L.	11 9 16.74
Santiago sid. time S. L.	11 13 44.02
Interval	4 27.28

	″
Δ N. S. limbs micr. in rev. 1.598	= 31.14
Variation of declination in 4*m.* 27*s.* . . .	— 2.17
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	26.77

	″
Δ ρ at 11 h. 9 m.	0.46
Δ ρ at 11 13	0.56

JUNE 1, 1852.

Cloudy.

JUNE 2, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δα	Δδ	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 15548	17.5	30.5	43.1	56.4	9.4	10 38 43.38	— 3.61½			23.085	51.2	49.2
2	Venus . . . N.P.	55.3	9.2	22.2	35.0	47.6	10 40 21.86	+ 9.11½	+1 38.48	+12.73			
3	H. C. . . . 15548	34.5	47.5	0.5	13.3	26.3	10 43 0.42	— 4.10			Ther. att. 61.7		
4	Venus . . . S.P.	14.2	27.2	40.0	53.0	6.0	10 44 40.08	+11.09	1 39.66	15.19	Bar. red. to 32° F. 27.997		
5	H. C. . . . 15548	28.0	41.0	53.8	6.7	19.8	10 46 53.86	— 3.97½					
6	Venus . . . N.P.	7.6	20.5	33.5	46.5	59.4	10 48 33.50	+ 9.03	1 39.64	13.00½			
7	H. C. . . . 15548	54.2	7.5	20.3	32.6	46.0	10 51 20.12	— 4.47½					
8	Venus . . . S.P.	35.0	48.0	1.0	13.5	26.5	10 53 0.80	+10.41	1 40.68	14.88½			
9	H. C. . . . 15548	8.3	21.2	34.0	46.3	59.5	10 55 33.86	—5.12½					
10	Venus . . . N.P.	49.0	1.5	14.6	27.4	40.5	10 57 14.60	+8.16	1 40.74	13.28½			
11	H. C. . . . 15548	19.2	32.3	45.0	58.0	10.8	10 59 45.06	—5.53½					
12	Venus . . . .P.	59.8	13.5	26.5	39.5	52.5	11 1 26.36	+9.56	1 41.30	15.09½			
13	H. C. . . . 15548	4.5	17.6	30.5	43.5	56.5	11 4 30.52	—6.07½					
14	Venus . . . N.P.	46.5	59.6	12.5	25.3	38.2	11 6 12.42	+7.42	1 41.90	13.49½			
15	H. C. . . . 15548	54.0	7.0	19.8	32.5	45.7	11 9 19.80	—6.62					
16	Venus . . . S.P.	36.4	48.8	. .	14.8	28.0	11 11 2.00	+8.83½	1 42.20	15.45½			
17	H. C. . . . 15548	8.8	21.8	34.8	47.6	0.5	11 13 34.70	—6.91					
18	Venus . . . N.P.	51.5	4.5	17.5	30.5	43.5	11 15 17.50	+6.86	1 42.80	13.77			
19	H. C. . . . 15548	49.3	2.4	15.2	27.6	40.8	11 18 15.06	—7.38					
20	Venus . . . S.P.	32.8	45.5	58.5	11.5	24.5	11 19 58.56	+8.20½	1 43.50	15.58½			
21	H. C. . . . 15548	16.5	29.6	42.5	55.5	8.5	11 22 42.52	—7.90½					
22	Venus . . . N.P.	1.3	13.5	26.7	39.8	53.0	11 24 26.86	+6.14½	1 44.34	14.05			
23	H. C. . . . 15548	46.8	59.6	12.5	25.6	38.7	11 27 12.64	—8.29½					
24	Venus . . . S.P.	31.5	44.5	57.5	10.4	23.5	11 28 57.48	+7.48	1 44.84	15.77½			
25	H. C. . . . 15548	1.5	14.6	27.6	40.5	53.5	11 31 27.54	—8.80					
26	Venus . . . N.P.	47.5	0.5	13.5	26.5	39.4	11 33 13.48	+5.45	1 45.94	14.25			
27	H. C. . . . 15548	31.0	44.0	57.0	9.8	22.8	11 35 56.92	—8.92					
28	Venus . . . S.P.	17.0	30.2	43.3	56.0	9.0	11 37 43.10	+7.08	+1 46.18	+16.00			

Remarks.

There never was a sharp image during the observations. Both objects are bright enough, but are so unsteady that they appear blurred.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P.	Seven transits	11 6 28.60	+1 41.98	+13.512	=4 23.35
Mean S. P.	Seven transits	11 10 58.34	+1 42.62	+15.426	=5 0.65

	s.
Correction for chronometer at 11 h. 6 m.	—47.48
Correction for chronometer at 11 11	—47.48

	h. m. s.
Santiago sid. time N. L.	11 5 41.12
Santiago sid. time S. L.	11 10 10.86
Interval	4 29.74

	″
Δ N. S. limbs micr. in rev. . . . . 1.914 =	37.30
Variation of declination in 4*m*. 30*s*.	— 2.26
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	32.84

h. m.	″
Δ ρ at 11 5	0.50
Δ ρ at 11 9	0.61

JUNE 3, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Anon	. .	. .	50.0	. .	. .	10 56 49.98	+8.30			27.979	55.2	51.4
2	Venus . . . N.P.	59.5	12.5	25.5	38.5	51.5	10 59 25.50	−1.49	+2 35.52	−9.79			
3	Anon	. .	. .	15.0	. .	. .	11 3 14.98	+7.80			Ther. att. 62°.6 Bar. red. to 32° F. 27.888		
4	Venus . . . S.P.	24.5	38.0	51.0	. .	16.5	11 5 50.70	−0.10	2 35.72	7.90			
5	Anon	. .	48.5	1.5	14.3	. .	11 16 1.43	+6.39					
6	Venus . . . N.P.	13.5	26.1	39.0	52.2	5.1	11 18 39.18	−2.79	2 37.75	9.18			
7	Anon	. .	0.5	. .	26.3	. .	11 23 13.41	+5.71¼					
8	Venus . . . S.P.	26.0	. .	51.5	4.8	18.0	11 25 51.87	−1.65	+2 38.46	−7 36¼			

Remarks.

There is no star in the designated place of the Ephemeris, and this, the nearest, is probably of the 9th or 9½ magnitude. Sharp images. Stopped by increasing haze.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Two transits . . .	11 9 2.34	+2 36.63	−9.485	=3 4.86
Mean S. P. . .	Two transits . . .	11 15 51.28	+2 37.09	−7.632	=2 28.75

	h. m.	s.
Correction for chronometer at	11 9 . . .	−47.90
Correction for chronometer at	11 16 . . .	−47.90

	h. m. s.
Santiago sid. time N. L.	11 8 14.44
Santiago sid. time S. L.	11 15 3.38
Interval	6 48.94

	″
Δ N. S. limbs micr. in rev.	1.853 = 36.11
Variation of declination in 6*m*. 49*s*. . .	− 3.55
Corr. for diam. of micr. wires	− 2.20
Observed N. S. diameter	30.36

	h. m.	″
Δ ρ at	11 7	0.35
Δ ρ at	11 14	0.30

JUNE 4—11, 1852.

Cloudy.

JUNE 12, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	47.0	0.0	12.5	25.3	38.0	11 25 12.56	−7.08			28.037	48.0	46.6
2	H. C. . . . 16659	. .	15.8	28.5	41.0	54.0	11 28 28.50	+0.72	−3 15.94	−7.80			
3	Venus . . . S.P.	. .	0.3	12.9	25.6	38.5	11 31 13.00	−8.57			Ther. att. 60°.9 Bar. red. to 32° F. 27.951		
4	H. C. . . . 16659	2.8	15.5	. .	41.2	54.0	11 34 28.37	+1.42	3 15.37	9.99			
5	Venus . . . N.P.	56.5	9.0	22.0	34.8	47.6	11 36 21.98	−6.10½					
6 a	H. C. . . . 16659	11.5	24.3	37.0	49.6	2.5	11 39 36.98	+2.12	3 15.00	8.22½			
7	Venus . . . S.P.	13.5	26.5	39.2	52.0	4.6	11 41 39.16	−7.61					
8	H. C. . . . 16659	28.0	41.0	53.6	6.5	19.5	11 44 53.72	+2.70	3 14.56	10.31			
9	Venus . . . N.P.	27.0	39.8	52.7	5.0	18.3	11 46 52.56	−5.07					
10	H. C. . . . 16659	41.5	54.0	. .	19.6	. .	11 50 6.80	+3.09½	−3 14.24	−8.16½			

JUNE 12, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	Venus . . . S.P.	5.0	17.8	30.5	43.2 a	56.0	11 52 30.50	—6.80			28.037	48.0	46.6
12 b	H. C. . . . 16659	. .	31.5	. .	. .	. .	11 55 44.15	+3.95	—3 13.65	—10.75			
13	Venus . . . N.P.	36.0	48.5	1.5	14.0	26.8	12 1 1.36	—4.00½			Ther. att. 60°.9		
14	H. C. . . . 16659	48.5	. .	14.0	26.8	39.7	12 4 14.09	+4.90	3 12.73	8.90½	Bar. red. to 32° F. 27.951		
15	Venus . . . S.P.	35.0	48.0	0.8	13.5	26.3	12 7 0.72	—5.60½					
16	H. C. . . . 16659	. .	0.5	. .	26.2	. .	12 10 13.36	+5.50½	—3 12.64	—11.11			

Remarks.

Planet sharp and steady; but there is so much haze that the star is extremely dim.

a Perhaps a little open. Recorded 42.5*s*. at wire E. *b* Too dim.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Four transits . . .	11 42 22.11	—3 14.48 . . .	— 8.274	=2 41.26
Mean S. P. . .	Four transits . . .	11 48 5.84	—3 14.05 . . .	—10.540	=3 25.42

	h. m.	s.
Correction for chronometer at	11 42 . . .	—49.08
Correction for chronometer at	11 48 . . .	—49.08

	h. m. s.
Santisgo sid. time N. L.	11 41 33.03
Santiago sid. time S. L.	11 47 16.76
Interval	5 43.73

	″
Δ N. S. limbs micr. in rev. . . . . . . 2.266 =	44.16
Variation of declination in 5*m*. 44*s*. . .	— 3.32
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	38.64

	h. m.	s.
Δ ρ at	11 43	0.31
Δ ρ at	11 49	0.42

JUNE 13, 1852.

Cloudy.

JUNE 14, 1852.

Cloudy.

JUNE 15, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	49.8	2.5	15.5	28.0	41.0	11 32 15.36	—5.21			28.109	44.8	43.3
2	H. C. . . . 17013	. .	57.5	10.5	23.1	35.5	11 39 10.33	4.68	—6 54.97	—0.53			
3	Venus . . . S.P.	29.5	42.0	55.0	7.5	20.4	11 41 54.88	4.07			Ther. att. 57°.1		
4	H. C. . . . 17013	24.0	36.5	49.0	1.6	14.5	11 48 49.12	5.81	6 54.24	+1.74	Bar. red. to 32° F. 28.035		
5	Venus . . . N.P.	25.0	37.5	50.5	3.0	15.9	11 50 50.38	7.12					
6	H. C. . . . 17013	19.8	. .	44.6	56.5	9.5	11 57 44.45	7.10½	6 54.07	—0.01½			
7 a	Venus . . . S.P.	26.6	39.5	52.2	4.9	17.8	12 0 52.20	4.88					
8	H. C. . . . 17013	19.5	. .	45.4	57.7	10.5	12 7 45.12	7.29	6 52.92	+2.41			
9	Venus . . . N.P.	24.6	37.3	50.5	3.0	15.5	12 9 50.18	8.65					
10	H. C. . . . 17013	17.5	29.5	42.5	55.5	8.0	12 16 42.60	9.25½	6 52.42	0.60½			
11	Venus . . . S.P.	57.0	10.0	22.7	35.5	47.5	12 19 22.54	7.16					
12	H. C. . . . 17013	49.0	. .	14.5	27.0	39.5	12 26 14.35	—10.21	—6 51.81	+3.05			

JUNE 15, 1852—Continued.

Remarks.

Images quite sharp, and both objects steady during the first four observations.

a Micrometer recorded — 5.88 rev.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Three transits . . .	11 50 58.64	— 6 53.82	+ 0.020	= 0 0.39
Mean S. P. . . .	Three transits . . .	12 0 43.21	— 6 52.99	+ 2.400	= 0 46.78

	h. m.	s.
Correction for chronometer at	11 51 . .	— 46 12
Correction for chronometer at	12 1 . .	— 46.12

	h. m. s.
Santiago sid. time N. L.	11 50 12.52
Santiago sid. time S. L.	11 59 57.09
Interval	9 44.57

	″
Δ N. S. limbs micr. in rev.	2.380 = 46.39
Variation of declination in 9m. 45s. . .	— 5.70
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	38.49

h. m.	″
Δ ρ at 11 54	0.00
Δ ρ at 12 3	0.10

JUNE 16—22, 1852.

Cloudy.

JUNE 22, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . .	274	. .	34.5	. .	59.5	. .	12 3 47.02	—9.57½			28.065	52.8	49.3
2	Venus . . .	N.P.	. .	30.0	42.5	55.0	. .	12 4 42.50	3.92½	+55.48	+5.65			
3	Bessel . . .	274	. .	. .	14.0	. .	. .	12 7 13.98	10.03			Ther. att. 60°.1		
4	Venus . . .	S.P.	44.6	. .	10.0	. .	34.6	12 8 9.72	1.98½	55.74	8.04½	Bar. red. to 32° F.		
5	Bessel . . .	274	. .	. .	23.0	. .	. .	12 10 22.98	10.41½			27.982		
6	Venus . . .	N.P.	53.5	. .	18.5	. .	44.0	12 11 18.66	4.71½	55.68	5.70			
7	Bessel . . .	274	. .	. .	28.0	. .	. .	12 14 27.98	10.90					
8	Venus . . .	S.P.	59.5	. .	24.5	. .	49.5	12 15 24.49	2.65	56.51	8.25			
9	Bessel . . .	274	. .	. .	27.4	. .	. .	12 18 27.38	11.37½					
10 a	Venus . . .	N.P.	. .	. .	24.0	. .	. .	12 19 23.98	5.46	56.60	5.91½			
11	Bessel . . .	274	. .	. .	54.2	. .	. .	12 21 54.18	11.80					
12	Venus . . .	S.P.	. .	. .	49.5	. .	15.5	12 22 50.03	3.33	55.85	8.47			
13	Bessel . . .	274	. .	. .	16.0	. .	. .	12 27 15.98	12.32					
14	Venus . . .	N.P.	47.0	. .	12.5	. .	37.8	12 28 12.42	6.07	56.44	6.25			
15	Bessel . . .	274	. .	. .	8.5	. .	. .	12 31 8.48	12.72½					
16	Venus . . .	S.P.	40.5	. .	5.8	. .	31.0	12 32 5.76	4.20½	57.28	8.52			
17	Bessel . . .	274	. .	. .	57.0	. .	. .	12 36 56.98	13.25					
18	Venus . . .	N.P.	28.3	. .	53.5	. .	18.5	12 37 53.42	6.79	56.44	6.46			
19	Bessel . . .	274	. .	. .	22.5	. .	. .	12 40 22.48	13.54½					
20	Venus . . .	S.P.	53.2	. .	19.0	. .	44.0	12 41 18.72	—4.68	+56.24	+8.86½			

JUNE 22, 1852—Continued.

Remarks.

At the commencement images very sharp; yet there has been a vibratory motion all the time, which prevented any of the measures from being made with satisfaction.

a Recorded 43.2*s*. at wire E.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean N. P.	Five transits . . .	12 20 18.20	+56.13	+5.995	=1 56.84
Mean S. P.	Five transits . . .	12 23 57.74	+56.32	+8.430	=2 44.30

	m. s.		h. m. s.
Correction for chronometer at 12 20 h. m. . .	—1 5.97	Santiago sid. time N. L.	12 19 12.23
Correction for chronometer at 12 24 . .	—1 5.97	Santiago sid. time S. L.	12 22 51.77
		Interval	3 39.54

	″	h. m.	″
Δ N. S. limbs micr. in rev.	2.435=47.46	Δ ρ at 12 19	0.24
Variation of declination in 3*m*. 40*s*. . .	— 2.10	Δ ρ at 12 22	0.36
Corr. for diam. of micr. wires	— 2.20		
Observed N. S. diameter	43.16		

JUNE 23, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . .	274	. .	. .	15.5	28.0	. .	12 5 15.53	—6.82			27.937	54.2	47.3
2	Venus . . .	N.P.	43.1	55.5	8.5	21.0	33.7	12 7 8.36	4.57	+1 52.83	+2.25			
3	Bessel . . .	274	. .	. .	25.4	37.5	49.8	12 9 25.13	7.77½			Ther. att. 58°.6		
4	Venus . . .	S.P.	53.3	6.0	18.5	31.0	43.5	12 11 18.46	2.83½	1 53.33	4.94	Bar. red. to 32° F. 27.858		
5 *a*	Bessel . . .	274	51.5	3.7	16.0	28.5	41.3	12 14 16.20	8.39					
6	Venus . . .	N.P.	44.3	57.0	9.5	22.1	34.5	12 16 9.48	5.75	1 53.28	2.64			
7	Bessel . . .	274	21.2	33.6	. .	58.8	11.5	12 19 46.28	9.27					
8	Venus . . .	S.P.	14.5	27.5	40.0	. .	4.8	12 21 39.80	3.91	1 53.52	5.36			
9	Bessel . . .	274	21.0	. .	46.0	. .	11.0	12 24 45.99	11.81					
10	Venus . . .	N.P.	14.5	. .	39.5	. .	4.7	12 26 39.56	8.76	1 53.57	3.05			
11	Bessel . . .	274	58.2	. .	23.5	. .	48.5	12 29 23.39	7.86					
12	Venus . . .	S.P.	52.0	. .	17.1	. .	42.3	12 31 17.12	2.00	1 53.73	5.86			
13	Bessel . . .	274	19.0	. .	44.0	. .	9.0	12 33 43.99	8.01½					
14	Venus . . .	N.P.	12.5	. .	38.0	. .	3.0	12 35 37.82	4.63½	1 53.83	3.38			
15	Bessel . . .	274	. .	10.5	23.2	. .	48.2	12 38 23.15	8.34					
16	Venus . . .	S.P.	52.0	4.5	17.1	. .	42.3	12 40 17.08	2.51	1 53.93	5.83			
17	Bessel . . .	274	. .	56.8	9.0	22.0	34.5	12 43 9.35	8.73					
18	Venus . . .	N.P.	38.5	50.8	3.5	. .	28.8	12 45 3.50	5.16	1 54.15	3.57			
19	Bessel . . .	274	. .	. .	51.5	. .	16.3	12 49 51.45	8.32½					
20	Venus . . .	S.P.	20.5	. .	45.5	57.5	10.5	12 51 45.40	2.07	1 53.95	6.25½			
21	Bessel . . .	274	0.0	. .	25.1	. .	49.8	12 54 24.96	8.40½					
22	Venus . . .	N.P.	54.2	. .	19.5	. .	44.7	12 56 19.46	4.58½	1 54.50	3.82			
23	Bessel . . .	274	. .	2.6	15.5	. .	40.0	12 59 15.22	8.42½					
24	Venus . . .	S.P.	44.3	. .	9.5	. .	35.0	13 1 9.59	—2.03½	+1 54.37	+6.39			

JUNE 23, 1852—Continued.

Remarks.

Sharp, clean images throughout; and, if the star would have permitted a little more light, I should have put down all the measures satisfactory.
a Star recorded 15.5*s*. at wire C.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . .	Six transits	12 31 9.70	+1 53.69	+3.102	=1 0.46
Mean S. P. . .	Six transits	12 36 14.58	+1 53.80	+5.772	=1 52.50

	m. s.		h. m. s.
Correction for chronometer at 12 31 . . .	—1 6.11	Santiago sid. time N. L.	12 30 3.59
Correction for chronometer at 12 36 . . .	—1 6.11	Santiago sid. time S. L.	12 35 8.47
		Interval	5 4.88

	″		″
Δ N. S. limbs micr. in rev.	2.670 = 52.04	Δ ρ at 12 29	0.14
Variation of declination in 5*m*. 5*s*. . .	— 2.85	Δ ρ at 12 34	0.29
Corr. for diam. of micr. wires . . .	— 2.20		
Observed N. S. diameter	46.99		

JUNE 24, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.P.	43.0	. .	8.2	. .	33.5	12 16 8.22	+6.03			28.004	53.5	49.2
2	Bessel . . . 274	. .	. .	37.0	. .	2.2	12 20 37.15	—5.51	—4 28.93	+11.54			
3	Venus . . . S.P.	57.0	. .	23.0	. .	48.5	12 23 22.82	+7.43			Ther. att. 59°.7		
4 *a*	Bessel . . . 274	. .	. .	51.5	. .	17.0	12 27 51.80	—6.53	4 28.98	13.96	Bar. red. to 32° F. 27.921		
5	Venus . . . N.P.	10.0	. .	35.3	. .	0.5	12 30 35.26	+4.38					
6	Bessel . . . 274	38.5	. .	3.6	. .	29.0	12 35 3.69	—7.42	4 28.43	11.80			
7	Venus . . . S.P.	59.7	. .	25.0	. .	50.3	12 37 24.99	+6.33½					
8	Bessel . . . 274	28.0	. .	53.6	. .	18.5	12 41 53.36	—8.00	4 28.37	14.33½			
9	Venus . . . N.P.	. .	. .	50.0	. .	15.0	12 43 50.05	+3.64					
10	Bessel . . . 274	. .	. .	18.5	. .	43.5	12 48 18.55	—8.52	4 28.50	12.16			
11	Venus . . . S.P.	19.0	. .	44.5	. .	9.5	12 50 44.32	+5.69½					
12	Bessel . . . 274	47.5	. .	12.5	. .	37.5	12 55 12.47	—9.01	—4 28.15	+14.70½			

Remarks.

Images good and steady, but the star is too small for satisfactory work; the declination measures, however, are regarded good.
a Recorded 53.5*s*. at wire C.

Results.

		h. m. s.	m. s.	Rev	′ ″
Mean N. P. . .	Three transits . . .	12 30 11.18	— 4 28.62	+ 11.833 . . .	= 3 50.62
Mean S. P. . .	Three transits . . .	12 37 10.71	— 4 28.50	+ 14.333 . . .	= 4 39.34

	m. s.		h. m. s.
Correction for chronometer at 12 30 . . .	—1 6.90	Santiago sid. time N. L.	12 29 4.28
Correction for chronometer at 12 37 . . .	—1 6.90	Santiago sid. time S. L.	12 36 3.81
		Interval	6 59.53

	″		″
Δ N. S. limbs micr. in rev.	2.500 = 48.72	Δ ρ at 12 31	0.55
Variation of declination in 7*m*. 0*s*. . .	— 3.87	Δ ρ at 12 38	0.76
Corr. for diam. of micr. wires . . .	— 2.20		
Observed N. S. diameter	42.65		

JUNE 25, 26, 27, 1852.

Cloudy.

JUNE 28, 1852.

Cloudy. There was quite a sharp earthquake between 1 and 2 A. M.

JUNE 29 to JULY 4, 1852.

Cloudy.

JULY 5, 1852.

There was a severe earthquake from 7*h*. 37*m*. 17*s*. to 7*h*. 37*m*. 52*s*. sid. time. The night was cloudy.

JULY 6, 1852.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . .	273	. .	37.5	49.5	. .	14.3	12 56 49.68	—2.96			28.094	47.4	43.7
2	Venus . . .	N.P.	. .	47.5	59.8	12.0	. .	12 59 59.77	+2.09½	+3 10.09	+5.05½			
3	Bessel . . .	273	. .	. .	19.5	31.6	44.0	13 2 19.48	—2.92½			Ther. att. 58°.0 Bar. red. to 32° F. 28.017		
4	Venus . . .	N.P.	4.5	16.8	29.3	41.5	54.1	13 5 29.24	+2.29	3 9.81	5.21½			
5	Bessel . . .	273	. .	58.7	11.6	24.0	. .	13 8 11.43	—2.57½					
6	Venus . . .	N.P.	56.5	. .	21.1	33.9	46.3	13 11 21.38	+2.83	3 9.95	5.40½			
7	Bessel . . .	273	. .	51.7	4.3	16.3	. .	13 14 4.10	—1.75					
8	Venus . . .	N.P.	48.5	1.0	13.2	25.7	38.1	13 17 13.30	+3.69½	+3 9.20	+5.44½			

Remarks.

Very sharp and steady until the last observation.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. P. . . .	Four transits . . .	13 8 30.92	+3 9.76	+5.280	=1 42.91

Correction for chronometer at 13 h. 8 m. . . —1 m. 7.21 s. Santiago sid. time N.P . . . . 13 h. 7 m. 23.71 s.

Δ ρ at 13 h. 6 m. . . . . 0.53″

JULY 7, 1852.

At night the comparing star was not perceptible through the thin cirri until 13*h*. sid. time, at which time the planet had become too much blurred for measures.

JULY 8, 1852.

Atmosphere this evening far worse than last night.

JULY 9, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . . 273	53.5	6.2	18.5	30.8	. .	12 58 18.37	—1.45			27.972	51.0	45.3
2	Venus . . . N.P.	. .	4.0	16.7	28.9	41.0	12 59 16.53	—0.06	+58.16	+1.39			
3	Bessel . . . 273	. .	3.6	15.7	28.0	. .	13 1 15.77	+3.02½			Ther. att. 58°.1 Bar. red. to 32° F. 27.895		
4	Venus . . . N. .	48.5	11.0	13.5	25.5	38.5	13 2 13.40	4.45	57.63	1.42½			
5	Bessel . . . 27	10.5	22.6	35.2	47.7	. .	13 4 35.12	3.03½					
6	Venus . . . N.P.	. .	20.3	32.5	44.6	. .	13 5 32.47	4.61	57.35	1.57½			
7	Bessel . . . 273	38.2	50.9	3.0	15.3	. .	13 7 2.97	3.30					
8	Venus . . . N.P.	35.3	48.0	0.0	12.7	25.2	13 8 0.24	4.90	57.27	1.60			
9	Bessel . . . 273	13.5	26.0	38.4	50.5	. .	13 9 38.22	3.45					
10	Venus . . . N.P.	10.3	22.7	35.2	47.5	0.0	13 10 35.14	5.02	56.92	1.57			
11	Bessel . . . 273	50.5	3.0	16.0	28.3	. .	13 12 15.57	3.76					
12	Venus . . . N.P.	48.0	0.5	13.0	25.2	38.0	13 13 12.94	5.49	57.37	1.73			
13	Bessel . . . 273	. .	25.8	38.0	50.6	. .	13 15 38.13	4.58					
14	Venus . . . N.P.	. .	22.5	35.0	47.5	. .	13 16 35.00	6.32	56.87	1.74			
15	Bessel . . . 273	. .	9.8	22.5	35.2	. .	13 18 22.50	5.22½					
16	Venus . . . N.P.	. .	6.3	18.5	31.5	. .	13 19 18.77	6.98	56.27	1.75½			
17	Bessel . . . 273	. .	34.0	46.5	59.0	. .	13 21 46.50	6.32					
18	Venus . . . N.P.	. .	29.8	42.5	55.0	. .	13 22 42.43	8.10½	55.93	1.78½			
19	Bessel . . . 273	. .	26.5	39.0	51.5	. .	13 24 39.00	7.60					
20 a	Venus . . . N.P.	. .	22.3	35.0	47.4	. .	13 25 34.90	+9.43½	+55.90	+1.83½			

Remarks.

The first six observations were made by daylight, and are tolerably fair, though I cannot say that either object was ever sharp or steady.

a Not to be depended upon.

Results.

Mean N. P. . . Ten transits . . . 13h 12m 18.18s + 56.97s . . . . + 1.640 Rev. . . . . = 0′ 31″.96

Correction for chronometer at 13h 12m . . . — 1m 5.67s Santiago sid. time N. P. 13h 11m 12.51s

Δ ρ at 13h 11m . . . . 0″.27

JULY 10, 1852.

It was not possible to see the comparison star through the cirri. Diameter of Venus from a mean of 6 measures, at 12*h*. 54*m*. sid. time, 2.962 rev. Corrected diameter, 55″.53.

JULY 11 and 12, 1852.

Cloudy.

JULY 13, 1852.

Venus visible, but so blurred and unsteady as to render observations impossible. Cloudy until the 18th of July.

JULY 18, 1852.

Clouds prevented observations until the 26th of July, except when the planet was too near the sun.

JULY 27, 1852.

The comparing star was not visible in the morning twilight.

JULY 28 and 29, 1852.

Cloudy.

JULY 30, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	H. C. . . . 14961	. .	. .	3.0	. .	. .	2 50 2.98	+4.89			28.036	37.5	36.8
2	Venus . . . S.F.	. .	. .	55.0	. .	. .	2 50 54.98	—4.31½	+52.00	— 9.20½			
3	H. C. . . . 14961	. .	. .	34.3	. .	. .	2 52 34.28	+4.89			Ther. att. 54°.5 Bar. red. to 32° F. 27.970		
4	Venus . . . N.F.	. .	. .	27.5	. .	. .	2 53 27.48	—7.57	53.20	12.46			
5	H. C. . . . 14961	. .	. .	23.5	. .	. .	2 55 23.48	+4.81½					
6	Venus . . . S.F.	. .	. .	16.0	. .	. .	2 56 15.98	—4.60	52.50	9.44½			
7	H. C. . . . 14961	. .	. .	13.6	. .	. .	2 58 13.58	+4.82½					
8	Venus . . . N.F.	. .	. .	6.0	. .	. .	2 59 5.98	—7.81	52.40	12.63½			
9	H. C. . . . 14961	. .	. .	52.6	. .	. .	3 0 52.58	+4.68					
10	Venus . . . N.F.	. .	. .	45.5	. .	. .	3 1 45.48	—7.86	+52.90	12.54			
11	H. C. . . . 14961	. .	. .	. .	. .	. .	. . . .	+4.77½					
12*a*	Venus . . . S.F.	. .	. .	44.5	. .	. .	3 4 44.48	—4.81	. . .	— 9.58½			

Remarks.

A dripping morning; even the object-glass, although under cover, suffused with moisture before it had been exposed ten minutes. Thus the images were never sharp; and, indeed, the star was at least 3″ in diameter all the time, though the planet was tolerably favorable for measures.

a This observation omitted in the results.

Results.

		h. m. s.
Mean S. F. . .	Two transits . . .	2 53 35.48
Mean N. F. . .	Three transits . . .	2 58 6.31

s.	Rev.	′ ″
+ 52.25	— 9.325	= 3 1.74
+ 52.83	— 12.545	= 4 4.50

	h. m.	s.
Correction for chronometer at	2 53	+ 23.41
Correction for chronometer at	2 58	+ 23.42

	h. m. s.
Santiago sid. time S. F.	2 53 58.90
Santiago sid. time N. F.	2 58 29.73
Interval	4 30.83

	″
Δ N. S. limbs micr. in rev.	3.220 = 62.76
Variation of declination in 4*m*. 31*s*. . .	— 0.25
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	60.31

h. m.	′
Δ ρ at 2 53.	0.88
Δ ρ at 2 58.	1.03

JULY 31, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 14861	10.5	23.5	35.0	46.5	59.0	2 48 34.90	—1.54			28.000	36.0	35.4
2	Venus . . . N.F.	29.5	. .	54.5	7.0	20.2	2 51 54.76	+2.92	+3 19.86	+4.46			
3	H. C. . . . 14861	39.2	52.0	4.6	17.5	29.4	2 54 4.54	—1.75			Ther. att. 55°.5 Bar red. to 32° F. 27.930		
4	Venus . . . S.F.	0.5	12.7	25.5	38.0	50.3	2 57 25.40	+5.74	3 20.86	7.49			
5	H. C. . . . 14861	20.5	33.0	45.0	57.5	9.5	2 59 45.10	—1.73½					
6	Venus . . . N.F.	40.2	52.2	4.5	17.0	29.0	3 3 4.58	+2.76½	3 19.48	4.50			
7	H. C. . . . 14861	38.3	50.6	2.5	15.0	27.5	3 5 2.78	—1.56½					
8	Venus . . . S.F.	57.5	10.0	22.5	34.7	46.8	3 8 22.30	+5.93	+3 19.52	+7.49½			

Remarks.

Morning similar to that of yesterday. The planet twinkling to the eye; and after the second observation its crescent was plainly visible without the telescope. During the first two observations neither object was sharp or steady.

Diameter of Venus from a mean of 5 measures at 3*h*. 17*m*. sid. time, 3.003 rev. Corrected diameter, 56″.53.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. F. . .	Two transits . . .	2 57 29.67	+3 19.67	+4.480	=1 27.32
Mean S. F. . .	Two transits . . .	3 2 53.85	+3 20.19	+7.492	=2 26.02

	s.		h. m. s.
Correction for chronometer at 2 57	+26.61	Santiago sid. time N. F.	2 57 56.28
Correction for chronometer at 3 3	+26.61	Santiago sid. time S. F.	3 3 20.46
		Interval	5 24.18

	″	h. m.	′
Δ N. S. limbs micr. in rev.	3.012 = 58.70	Δ ρ at 2 56	0.38
Variation of declination in 5*m*. 24*s*. . .	+ 0.39	Δ ρ at 3 2	0.51
Corr. for diam. of micr. wires . . .	— 2.20		
Observed N. S. diameter	56.89		

AUGUST 1, 2, and 3, 1852.

Cloudy.

AUGUST 4, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	. .	35.5	48.8	1.0	13.5	2 49 48.86	—4.57			28.096	37.5	36.6
2	Bessel . . . 273	. .	15.5	28.0	40.5	53.0	2 53 28.16	7.63	—3 39.30	+3.06			
3	Venus . . . N.F.	8.5	21.0	33.8	45.0	57.0	2 55 32.93	7.29			Ther. att. 54°.7 Bar. red. to 32° F. 28.029		
4	Bessel . . . 273	46.5	59.5	12.0	24.0	36.5	2 59 11.70	7.73½	3 38.74	0.44½			
5	Venus . . . S.F.	45.5	57.5	10.5	22.5	35.0	3 3 10.20	4.36					
6	Bessel . . . 273	. .	37.5	49.5	2.0	14.3	3 6 49.73	7.53	3 39.53	3.17			
7	Venus . . . S.F.	5.0	17.3	29.3	41.5	53.5	3 8 29.32	4.07½					
8 *a*	Bessel . . . 273	44.3	56.0	8.5	21.0	33.5	3 12 8.66	—7.08	—3 39.34	+3.00½			

AUGUST 4, 1852—Continued.

Remarks.

Venus twinkling to the unassisted eye. Neither object was ever sharp or steady.

a Perhaps a little open.

Diameter of Venus from a mean of 6 measures, at 3*h*. 23*m*. sid. time, 2.917 rev. Corrected diameter, 54''.65.

Results.

		h. m. s.	m. s.	Rev.	' ''
Mean N. F. . .	One transit	2 55 32.96	— 3 38.74 . .	+ 0.445	= 0 8.67
Mean S. F. . .	Three transits . . .	3 0 29.46	— 3 39.39	+ 3.078	= 0 59.99

	h. m.	s.
Correction for chronometer at	2 56	+ 41.10
Correction for chronometer at	3 0	+ 41.10

	h. m. s.
Santiago sid. time N. F.	2 56 14.06
Santiago sid. time S. F.	3 1 10.56
Interval	4 56.50

	''
Δ N. S. limbs micr. in rev.	2.633 = 51.32
Variation of declination in 4*m*. 56*s*. . .	+ 0.56
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	49.68

h. m.	''
Δ ρ at 2 58	0.02
Δ ρ at 3 3	0.18

AUGUST 5, 1852.

There being an error of 10° in the computation of 14596 H. C., there is no comparing star for this day. The same star was also selected for the 6th of August.

AUGUST 7, 1852.

Cirri prevented any star smaller than a 5th magnitude from being seen to the N. E. during the morning twilight.

AUGUST 8, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . .	S.F.	13.0	25.6	37.5	49.5	2.5	2 46 37.62	—10.57			27.937	43.1	40.2
2	Bessel . . .	273	. .	56.5	9.0	. .	33.5	2 53 8.93	+ 6.18	—6 31.31	—16.75	Ther. att. 54°.1		
3	Venus . . .	N.F.	0.0	13.5	26.0	. .	50.5	2 56 25.54	—12.92			Bar. red. to 32° F.		
4	Bessel . . .	273	. .	. .	57.0	. .	. .	3 2 56.98	+ 6.34	—6 31.44	—19.26	27.872		

Remarks.

Object very badly defined, and the star so dim that no reliance can be placed on the measures.

Results.

		h. m. s.	m. s.	Rev.	' ''
Mean S. F. . .	One transit	2 46 37.62	— 6 31.31	— 16.750	= 5 26.46
Mean N. F. . .	One transit	2 56 25.54	— 6 31.44	— 19.260	= 6 15.38

	h. m.	s.
Correction for chronometer at	2 47	+ 50.00
Correction for chronometer at	2 56	+ 50.00

	h. m. s.
Santiago sid. time S. F.	2 47 27.62
Santiago sid. time N. F.	2 57 15.54
Interval	9 47.92

	''
Δ N. S. limbs micr. in rev.	2.510 = 48.92
Variation of declination in 9*m*. 48*s*. . .	— 1.37
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	45.35

h. m.	''
Δ ρ at 2 51	1.36
Δ ρ at 3 0	1.20

AUGUST 9, 1852.

A dense fog that rose immediately after the planet, prevented any objects from being seen near the horizon.

AUGUST 10, 1852.

The dense fog covering the city since yesterday morning broke away suddenly at 7*h*. sid. time. August 11 was cloudy.

AUGUST 12, 1852.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . .	N.F.	17.5	30.0	42.0	54.0	7.0	2 56 42.10	—1.81½			28.252	37.8	36.7
2	Bessel . . .	276	. .	10.5	23.5	36.0	48.5	2 59 23.52	4.77	—2 41.42	+2.95½			
3	Venus . . .	S.F.	40.5	53.0	5.0	17.5	29.6	3 2 5.12	+0.93			Ther. att. 51°.1		
4	Bessel . . .	276	. .	34.0	46.3	58.5	11.0	3 4 46.35	—4.50½	2 41.23	5.43½	Bar. red. to 32° F. 28.196		
5	Venus . . .	N.F.	41.0	53.5	5.5	18.5	30.6	3 7 5.82	1.48					
6	Bessel . . .	276	20.5	32.6	44.5	56.5	9.0	3 9 44.62	4.56	2 38.80	3.08			
7	Venus . . .	S.F.	. .	39.6	51.5	3.5	16.5	3 11 51.67	+1.14½					
8	Bessel . . .	276	. .	20.2	32.5	44.5	. .	3 14 32.40	—4.29	2 40.73	5.43½			
9	Venus . . .	N.F.	6.5	18.6	31.5	43.5	. .	3 16 31.12	0.93					
10	Bessel . . .	276	. .	57.5	9.5	22.0	. .	3 19 9.67	3.84½	2 38.55	2.91½			
11	Venus . . .	S.F.	6.5	19.0	31.5	44.1	56.0	3 21 31.42	+1.93					
12	Bessel . . .	276	47.5	58.0	. .	. .	. .	3 24 11.06	—3.34	2 39.64	5.27			
13	Venus . . .	N.F.	52.5	5.0	17.2	29.5	42.0	3 26 17.24	0.12					
14	Bessel . .	276	. .	44.0	. .	7.5	21.0	3 28 56.03	2.74	2 38.79	2.62			
15 *a*	Venus . . .	S.F.	41.5	53.3	. .	18.3	30.4	3 31 5.90	+3.09½					
16	Bessel . . .	276	. .	. .	45.0	57.0	9.5	3 33 44.97	—2.20	2 39.07	5.29½			
17	Venus . . .	N.F.	6.5	19.5	31.3	43.5	55.5	3 35 31.26	+0.85					
18	Bessel . . .	276	. .	. .	10.5	22.5	35.0	3 38 10.47	—1.77	—2 39.21	+2.62			

Remarks.

A good morning. Images not very sharp at first, but quite satisfactory during the last observations by daylight.

a By daylight.

Diameter of Venus from a mean of 6 measures, at 3*h*. 49*m*. sid. time, 2.571 rev. Corrected diameter, 47″.91.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. F. . .	Five transits . . .	3 16 25.51	— 2 39.35 . . .	+ 2.838	= 0 55.31
Mean S. F. . .	Four transits . . .	3 16 38.53	— 2 40.17 . . .	+ 5.359	= 1 44.45

	h. m.	m. s.
Correction for chronometer at	3 16 . . .	+ 1 1.78
Correction for chronometer at	3 17 . . .	+ 1 1.78

	h. m. s.
Santiago sid. time N. F.	3 17 27.29
Santiago sid. time S. F.	3 17 40.31
Interval	13.02

	″
Δ N. S. limbs micr. in rev. . . . . . 2.521 =	49.13
Variation of declination in 13*s*. . . .	+ 0.03
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	46.96

h. m.	″
Δ ρ at 3 19	0.11
Δ ρ at 3 19	0.21

AUGUST 13, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ *a*.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	17.5	30.5	42.3	55.0	7.5	2 50 42.56	—10.77			28.040	39.7	36.7
2 *a*	Bessel . . . 276	. .	. .	5.5	17.5	30.0	2 53 5.47	5.08½	—2 22.91	—5.68½	Ther. att. 54°.7		
3	Venus . . . N.F.	28.5	40.7	. .	4.6	17.3	2 55 52.80	13.52			Bar. red. to 32° F.		
4 *a*	Bessel . . . 276	50.2	2.3	14.5	27.0	39.5	2 58 14.70	5.16	2 21.90	8.36	27.973		
5	Venus . . . S.F.	17.0	29.6	42.3	. .	7.0	3 0 42.02	10.91					
6	Bessel . . . 276	. .	46.5	0.5	13.6	26.1	3 3 0.57	5.17½	2 18.55	5.73½			
7	Venus . . . N.F.	46.5	59.0	11.3	23.5	35.8	3 5 11.22	13.46					
8 *a*	Bessel . . . 276	. .	. .	34.0	46.5	58.5	3 7 34.12	5.10	2 22.90	8.36			
9	Venus . . . S.F.	. .	27.7	40.0	52.4	4.6	3 10 40.07	10.74					
10	Bessel . . . 276	34.3	46.9	59.0	11.0	24.0	3 12 59.04	4.86	2 18.97	5.88			
11	Venus . . . N.F.	46.0	58.5	10.6	23.3	35.0	3 16 10.68	13.81					
12	Bessel . . . 276	5.0	16.5	29.5	. .	. .	3 18 29.20	5.42½	2 18.52	8.38½			
13	Venus . . . S.F.	39.5	51.5	4.0	16.5	23.5	3 21 4.00	11.29					
14 *a*	Bessel . . . 276	2.0	14.3	27.0	39.0	51.0	3 23 26.66	5.42	2 22.66	5.87			
15	Venus . . . N.F.	29.8	42.5	54.5	7.6	19.5	3 28 54.78	10.49½			28.050	40.2	37.0
16	Bessel . . . 276	. .	1.2	13.0	25.3	37.8	3 31 13.22	1.99	2 18.44	8.50½			
17	Venus . . . S.F.	43.0	56.6	8.5	21.0	33.0	3 33 8.42	7.41½			Ther. att. 54°.6		
18	Bessel . . . 276	3.6	16.0	28.0	40.5	52.5	3 35 28.12	1.41	2 19.70	6.00½	Bar. red. to 32° F. 27.983		
19	Venus . . . N.F.	5.5	18.2	30.0	42.4	54.6	3 37 30.14	9.42					
20	Bessel . . . 276	. .	36.5	. .	1.0	13.5	3 39 48.87	—0.89	—2 18.73	—8.53			

Remarks.

Sharp images all the morning, but their cirri prevented the star from being seen under sufficient illumination for its observation with satisfaction. At 3*h*. 23*m*. it was found that the hour circle clamp was not fast, and, therefore, the differences of R. A. marked *a* are wrong, and are omitted in the results.

Diameter of Venus from a mean of six measures, at 3*h*. 46*m*. sid. time, 2.598 rev. Corrected diameter, 48″.43.

Results.

		h. m. s.	m. s.	Rev.	′
Mean S. F. . .	Three transits . . .	3 14 50.17	— 2 19.07	— 5.873	= 1 54.47
Mean N. F. . .	Three transits . . .	3 27 31.87	— 2 18.56	— 8.473	= 2 45.14

h. m.	m. s.		h. m. s.
Correction for chronometer at 3 15 . . .	+ 1 4.70	Santiago sid. time S. F.	3 15 54.87
Correction for chronometer at 3 28 . . .	+ 1 4.72	Santiago sid. time N. F.	3 28 36.59
		Interval	12 41.72

	″	h. m.	″
Δ N. S. limbs micr. in rev.	2.600 = 50.67	Δ ρ at 3 17	0.24
Variation of declination in 12*m*. 42*s*. . .	— 1.93	Δ ρ at 3 30	0.31
Corr. for diam. of micr. wires	— 2.20		
Observed N. S. diameter	46.54		

AUGUST 14, 1852.

On account of thin cirri, the comparison star could not be seen under illumination.

AUGUST 15, 1852.

Cloudy.

AUGUST 16, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	. .	5.5	17.6	30.0	42.5	3 3 17.79	—4.70½			28.025	51.5	47.8
2	Bessel . . . 276	51.8	4.5	16.5	29.0	41.5	3 6 16.66	+4.62½	—2 58.87	—9.33			
3	Venus . . . N.F.	31.5	44.0	56.0	8.5	21.0	3 8 56.20	—6.96½			Ther. att. 56°.0 Bar. red. to 32° F. 27.954		
4	Bessel . . . 276	. .	42.3	. .	. .	18.5	3 11 54.29	+4.90	2 58.09	11.86½			
5	Venus . . . S.F.	55.5	8.0	20.5	32.5	44.7	3 14 20.24	—4.14½					
6	Bessel . . . 276	. .	. .	17.5	. .	. .	3 17 17.48	+5.28	2 57.24	9.42½			
7	Venus . . . N.F.	35.3	48.0	0.0	12.5	24.6	3 21 0.08	—5.94					
8	Bessel . . . 276	33.5	45.5	58.0	. .	22.5	3 23 57.92	+5.96	2 57.84	11.90			
9	Venus . . . S.F.	. .	47.5	59.2	11.5	23.5	3 25 59.31	—3.19					
10	Bessel . . . 276	33.0	. .	56.6	9.0	21.4	3 28 56.94	+6.39	2 57.63	9.58			
11	Venus . . . N.F.	. .	5.5	17.5	29.6	42.5	3 32 17.66	—5.00					
12	Bessel . . . 276	51.0	2.6	15.0	27.5	40.0	3 35 15.22	+7.02½	2 57.56	12.02½			
13	Venus . . . S.F.	7.5	19.6	31.9	44.0	56.5	3 39 31.90	—1.99					
14	Bessel . . . 276	4.5	17.0	29.5	41.5	54.0	3 42 29.30	+7.71	2 57.40	9.70			
15	Venus . . . N.F.	13.5	26.5	38.5	50.6	3.0	3 44 33.42	—3.84½					
16	Bessel . . . 276	. .	24.0	36.2	. .	0.5	3 47 36.15	+8.36½	—2 57.73	—12.21			

Remarks.

Cirri prevented the star from being seen under the micrometer wire with sufficient distinctness to observe differences of R. A. accurately. Only the last two observations had sharp images.

a Very much blurred. b Daylight.

Diameter of Venus from a mean of 6 measures, at $3h.\ 53\frac{1}{2}m.$ sid. time, 2.354 rev. Corrected diameter, 43″.68.

Results.

	h. m. s.
Mean S. F. . . . Four transits . . .	3 20 47.21
Mean N. F. . . . Four transits . . .	3 26 43.09

h. m	m. s.
Correction for chronometer at 3 20 . . .	+1 10.34
Correction for chronometer at 3 26 . . .	+1 10.35

	″
Δ N. S. limbs micr. in rev. . . . . . . 2.491 =	48.55
Variation of declination in $5m.\ 56s.$ . .	— 0.87
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	45.48

m. s.	Rev.	′ ″
—2 57.78	+ 9.509	= 3 5.33
—2 57.78	+ 12.000	= 3 53.88

	h. m. s.
Santiago sid. time S. F.	3 21 57.55
Santiago sid. time N. F.	3 27 53.44
Interval	5 55.89

h. m.	″
Δ ρ at 3 23	0.38
Δ ρ at 3 29	0.43

AUGUST 21, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ a.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Venus . . . S.F.	. .	. .	30.3	. .	. .	2 55 30.28	—13.70			28.155	37.3	36.1
2	Bessel . . . 273	. .	. .	. .	. .	. .	. . . . .	2.66	. . .	—11.04			
3	Venus . . . N.F.	. .	. .	51.5	. .	. .	2 57 51.48	16.19			Ther. att. 47°.1 Bar. red. to 32° F. 28.110		
4	Bessel . . . 273	. .	. .	. .	. .	. .	. . . . .	2.89	. . .	13.30			
5	Venus . . . S.F.	. .	. .	0.0	. .	. .	3 0 59.98	13.60					
6	Bessel . . . 273	. .	. .	. .	. .	. .	. . . . .	—2.65½	. . .	—10.94½			

AUGUST 21, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
7	Venus . . . N.F.	. .	. .	27.0	. .	. .	3 4 26.98	—16.02			28.155	35.0	34.6
8	Bessel . . . 273	. .	. .	. . .	. .	. .	. . . . .	2.69	. . .	—13.33			
9	Venus . . . S.F.	. .	. .	53.5	. .	. .	3 8 53.48	13.58½			Ther. att. 47°.1 Bar. red. to 32° F. 28.110		
10	Bessel . . . 273	. .	. .	. .	. .	. .	. . . . .	2.55	. . .	11.03½			
11	Venus . . . N.F.	. .	. .	36.2	. .	. .	3 11 36.18	15.72½					
12	Bessel . . . 273	. .	. .	. . .	. .	. .	. . . . .	2.46	. . .	13.26½			
13	Venus . . . S.F.	. .	. .	7.5	. .	. .	3 14 7.48	13.50					
14	Bessel . . . 273	. .	. .	. . .	. .	. .	. . . . .	2.31½	. . .	11.18½			
15	Venus . . . N.F.	. .	. .	46.3	. .	. .	3 16 46.28	15.52					
16	Bessel . . . 273	. .	. .	59.5	. .	. .	3 16 59.48	2.20	—13.20	13.32			
17	Venus . . . S.F.	. .	. .	10.5	. .	. .	3 19 10.48	13.18½					
18	Bessel . . . 273	. .	. .	24.0	. .	. .	3 19 23.98	2 05	13.50	11.13½			
19	Venus . . . N.F.	. .	. .	57.5	. .	. .	3 21 57.48	15.26					
20	Bessel . . . 273	. .	. .	10.5	. .	. .	3 22 10.48	1.98	13.00	13.28			
21	Venus . . . S.F.	. .	. .	28.7	. .	. .	3 25 28.68	12.85½					
22	Bessel . . . 273	. .	. .	41.8	. .	. .	3 25 41.78	1.70	13.10	11.15½			
23	Venus . . . N.F.	. .	. .	17.5	. .	. .	3 28 17.48	14.80					
24	Bessel . . . 273	. .	. .	30.5	. .	. .	3 28 30.48	1.46	13.00	13.34			
25	Venus . . . S.F.	. .	. .	24.6	. .	. .	3 33 24.58	12.14					
26	Bessel . . . 273	. .	. .	37.5	. .	. .	3 33 37.48	0.88	12.90	11.26			
27	Venus . . . N.F.	. .	. .	57.5	. .	. .	3 35 57.48	14.10					
28	Bessel . . . 273	. .	. .	9.5	. .	. .	3 36 9.48	0.71	12.00	13.39			
29	Venus . . . S.F.	. .	. .	20.4	. .	. .	3 38 20.38	11.89					
30	Bessel . . . 273	. .	. .	32.2	. .	. .	3 38 32.18	0.52	11.80	11.37			
31	Venus . . . N.F.	. .	. .	46.0	. .	. .	3 41 45.98	13.62½					
32	Bessel . . . 273	. .	. .	58.0	. .	. .	3 41 57.98	0.07	12.00	13.55½			
33	Venus . . . S.F.	. .	. .	15.1	. .	. .	3 44 15.08	—11.34					
34	Bessel . . 273	. .	. .	26.5	. .	. .	3 44 26.48	+ 0.33½	11.40	11.67½			
35	Venus . . . N.F.	. .	. .	14.0	. .	. .	3 47 13.98	—13.17					
36	Bessel . . . 273	. .	. .	24.6	. .	. .	3 47 24.58	+ 0.51½	10.60	13.68½			
37	Venus . . . S.F.	. .	. .	9.5	. .	. .	3 50 9.48	—10.64					
38	Bessel . . . 273	. .	. .	20.5	. .	. .	3 50 20.48	+ 0.80½	11.00	11.44½			
39 a	Venus . . . N.F.	. .	. .	26.0	. .	. .	3 53 25.98	—11.15					
40	Bessel . . . 273	. .	. .	37.0	. .	. .	3 53 36.98	+ 2.47	11.00	13.62			
41	Venus . . S.F.	. .	. .	25.5	. .	. .	3 56 25.48	— 8.59					
42	Bessel . . . 273	. .	. .	36.0	. .	. .	3 56 35.98	+ 2.93½	10.50	11.52½			
43 b	Venus . . . N.F.	. .	. .	45.5	. .	. .	3 59 45.48	—10.48					
44	Bessel . . . 273	. .	. .	. .	. .	. .	. . . . .	+ 3.23½	. . .	13.71½			
45 b	Venus . . . S.F.	. .	. .	8.0	. .	. .	4 2 7.98	— 7.78					
46	Bessel . . . 273	. .	. .	. .	. .	. .	. . . . .	+ 3.68½	. . .	11.46½			
47 b	Venus . . . N.F.	. .	. .	24.0	. .	. .	4 4 23.98	— 9.64					
48	Bessel . . . 273	. .	. .	. .	. .	. .	. . . . .	+ 4.08½	. . .	13.72½			
49 b	Venus . . . S.F.	. .	. .	44.3	. .	. .	4 6 44.28	— 7.20½					
50	Bessel . . . 273	. .	. .	. .	. .	. .	. . . . .	+ 4.34½	. . .	11.55			
51 b	Venus . . . N.F.	. .	. .	4.6	. .	. .	4 9 4.58	— 9.12					
52	Bessel . . . 273	. .	. .	14.5	. .	. .	4 9 14.48	+ 4.68	— 9.90	—13.80			

AUGUST 21, 1852—Continued.

Remarks.

Fine clear morning. Tolerably sharp images and fair observations throughout.

a Daylight. *b* Omitted in the results.

Diameter of Venus from a mean of 6 measures, at 4*h*. 14*m*. sid. time, 2.249 rev. Corrected diameter 41″.63.

Results.

	h. m. s.	s.	Rev.	′ ″
Mean of three measures for N. F. . . .	3 4 38.21	. . . .	−13.298	=4 19.18
Mean of four measures for S. F.	3 4 52.80	. . . .	11.051	3 35.38
Mean N. F. . . Seven transits . . .	3 35 3.52	−12.11	13.456	4 22.26
Mean S. F. . . Seven transits . . .	3 38 10.60	−12.03	−11.365	=3 41.50

h. m.	m. s.		h. m. s.
Correction for chronometer at 3 5 . . .	+1 27.96	Santiago sid. time N. F.	3 6 6.17
Correction for chronometer at 3 5 . . .	+1 27.96	Santiago sid. time S. F.	3 6 20.76
		Interval	14.59

	″	h. m.	″
Δ N. S. limbs micr. in rev.	2.247 = 43.79	Δ ρ at 3 6	0.93
Variation of declination in 15*s*. . . .	+ 0.03	Δ ρ at 3 6	0.77
Corr. for diam. of micr. wires	− 2.20		
Observed N. S. diameter	41 62		

h. m.	m. s.		h. m. s.
Correction for chronometer at 3 35 . . .	+1 28.03	Santiago sid. time N. F.	3 36 31.55
Correction for chronometer at 3 38 . . .	+1 28.03	Santiago sid. time S. F.	3 39 38.63
		Interval	3 7.08

	″	h. m.	″
Δ N. S. limbs micr. in rev.	2.091 = 40.75	Δ ρ at 3 37	0.48
Variation of declination in 3*m*. 7*s*. . .	+ 0.37	Δ ρ at 3 40	0.39
Corr. for diam. of micr. wires	− 2.20		
Observed N. S. diameter	38.92		

AUGUST 22, 1852.

No. for reference.	Object.		Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
			A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°
1	Bessel . . .	273	. .	. .	3.5	. .	. .	3 25 3.48	−15.35½			27.942	34.0	33.4
2	Venus . . .	N.F.	. .	. .	21.5	. .	. .	3 25 21.48	8.12	+18.00	+7.23½			
3	Bessel . . .	273	57.3	. .	. .	. .	. .	3 28 21.78	14.02			Ther. att. 52°.9		
4	Venus . .	S.F.	. .	. .	40.5	. .	. .	3 28 40.48	4.63	18.70	9.39	Bar. red. to 32° F. 27.880		
5	Bessel . . .	273	59.5	. .	. .	. .	. .	3 31 23.98	14.77					
6	Venus . . .	N.F.	. .	. .	43.2	. .	. .	3 31 43.18	7.61	19.20	7.16			
7	Bessel . . .	273	. .	. .	. .	. .	. .	. . . .	14.35					
8 *a*	Venus . . .	S.F.	. .	. .	46.5	. .	. .	3 34 46.48	4.86	. . .	9.49			
9	Bessel . . .	273	9.5	. .	. .	. .	. .	3 38 33.98	14.08					
10	Venus . . .	N.F.	. .	. .	52.5	. .	. .	3 38 52.48	6.81	+18.50	7.27			
11	Bessel . . .	273	. .	. .	. .	. .	. .	. . . .	13.56					
12 *a*	Venus . . .	S.F.	. .	. .	54.3	. .	. .	3 42 54.28	4.25	. . .	9.31			
13	Bessel . . .	273	. .	. .	. .	. .	. .	. . . .	13.33					
14 *a*	Venus . . .	N.F.	. .	. .	56.0	. .	. .	3 45 55.98	− 6.26½	. . .	+7.06½			

AUGUST 22, 1852—Continued.

Remarks.

The planet was so very badly defined and unsteady that it was impossible to make even a second-rate measure. The star is extremely small for a 9th magnitude. There is another preceding it, and some 18 revolutions farther north.

a Omitted in the results.

Results.

		h. m. s.	s.	Rev.	′ ″
Mean S. F.	One transit	3 28 40.48	+18.70	+9.390	=3 3.01
Mean N. F.	Three transits	3 31 59.05	+18.57	+7.222	=2 20.76

	h. m.	m. s.
Correction for chronometer at	3 29	+1 31.58
Correction for chronometer at	3 32	+1 31.58

	h. m. s.
Santiago sid. time S. F.	3 30 12.06
Santiago sid. time N. F.	3 33 30.63
Interval	3 18.57

	″
Δ N. S. limbs micr. in rev.	2.168=42.25
Variation of declination in $3m.$ $19s.$	— 0.35
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	39.70

	h. m.	″
Δ ρ at	3 30	0.40
Δ ρ at	3 33	0.28

AUGUST 23, 1852.

No. for reference.	Object.		Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
			s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel	273	. .	. .	. .	. .	. .	. . . .	—7.40½			27.980	40.0	39.3
2 *a*	Venus	S.F.	. .	57.6	9.0	21.5	. .	3 32 9.37	5.86	. . .	+1.54½			
3	Bessel	273	. .	. .	. .	15.0	. .	3 34 2.78	7.01			Ther. att. 52°.1		
4	Venus	N.F.	. .	52.5	3.8	16.0	. .	3 36 4.10	7.76½	+2 1.32	—0.75½	Bar. red. to 32° F. 27.921		
5	Bessel	273	. .	. .	. .	20.0	. .	3 38 7.78	6.55					
6	Venus	S.F.	. .	56.5	8.5	20.6	. .	3 40 8.53	5.12	2 0.75	+1.43			
7	Bessel	273	. .	. .	19.2	31.0	. .	3 42 18.98	6.06					
8	Venus	N.F.	. .	8.8	20.7	33.0	. .	3 44 20.83	6.95	2 1.85	—0.89			
9	Bessel	273	. .	27.1	. .	50.5	. .	3 46 38.82	5.34					
10	Venus	N.F.	. .	28.5	40.3	52.5	. .	3 48 40.43	6.13	2 1.61	—0.79			
11	Bessel	273	. .	39.5	. .	3.5	. .	3 50 51.52	4.87					
12	Venus	S.F.	. .	40.8	52.7	5.0	. .	3 52 52.83	—3.49	+2 1.31	+1.38			

Remarks.

Same remarks as yesterday, only, if possible, there is a worse condition of the atmosphere. The star is at least 1½ magnitude smaller than the one in A. R. $8h.$ $33m.$ $18s.$ ± dec. + 15° 56′.

a Omitted in the results.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. F.	Three transits	3 43 1.79	+2 1.59	—0.812	=0 15.83
Mean S. F.	Two transits	3 46 30.68	+2 1.03	+1.405	=0 27.39

	h. m.	m. s.
Correction for chronometer at	3 43	+1 34.05
Correction for chronometer at	3 46	+1 34.05

	h. m. s.
Santiago sid. time N. F.	3 44 35.84
Santiago sid. time S. F.	3 48 4.53
Interval	3 28.89

	s.
Δ N. S. limbs micr. in rev.	2.217=43.22
Variation of declination in $3m.$ $29s.$	+ 0.34
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	41.36

	h. m.	″
Δ ρ at	3 44	0.03
Δ ρ at	3 47	0.05

AUGUST 28, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	H. C. . . . 15338	. .	22.5	34.6	47.0	. .	3 52 34.70	—5.21½			28.097	43.1	40.6
2	Venus . . . N.F.	. .	34.0	45.7	57.8	10.5	3 53 45.87	7.41½	+1 11.17	—2.20			
3	H. C. . . . 15338	. .	21.5	33.7	46.0	. .	3 55 33.73	4.72			Ther. att. 51°.7		
4	Venus . . . S.F.	20.3	32.7	44.8	57.2	9.5	3 56 44.90	4.85	1 11.17	0.13	Bar. red. to 32° F. 28.028		
5	H. C. . . . 15338	. .	12.5	24.6	37.0	. .	3 58 24.70	4.35					
6	Venus . . . N.F.	10.6	23.5	35.5	47.8	0.6	3 59 35.60	6.60½	1 10.90	2.25½			
7 *a*	H. C. . . . 15338	. .	30.5	42.5	. .	. .	4 1 42.61	4.07					
8	Venus . . . S.F.	29.3	41.9	54.0	6.4	18.5	4 2 54.02	4.32	1 11.41	0.25			
9 *b*	H. C. . . . 15338	. .	36.6	49.0	1.2	. .	4 10 48.93	3.02					
10	Venus . . . N.F.	. .	. .	1.5	. .	26.0	4 12 1.49	5.31	1 12.56	2.29			
11	H. C. . . . 15338	. .	12.5	25.0	37.2	. .	4 18 24.90	2.16					
12	Venus . . . S.F.	13.0	25.6	38.0	50.3	2.5	4 19 37.88	2.37½	1 12.98	0.21½			
13	H. C. . . . 15338	. .	. .	20.5	32.8	. .	4 21 20.52	1.81					
14	Venus . . . N.F.	9.5	22.0	34.3	46.4	58.8	4 22 34.20	—4.25	+1 13.68	—2.44			

Remarks.

Cleared for a little while at times, though there never was a sharp image of the planet.

a Obscured by clouds. *b* Daylight.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Three transits . .	4 6 25.60	+1 11.85	—0.198	=0 3.86
Mean N. F. . . .	Four transits . . .	4 6 59.29	+1 12.08	—2.296	=0 44.75

	h. m.	m. s.
Correction for chronometer at	4 6 . . .	+1 56.31
Correction for chronometer at	4 7 . . .	+1 56.31

	h. m. s.
Santiago sid. time S. F.	4 8 21.91
Santiago sid. time N. F.	4 8 55.60
Interval	33.69

	″
Δ N. S. limbs micr. in rev. . . . . . . 2.098 =	40.88
Variation of declination in 34*s*. . . .	— 0.02
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	38.66

	h. m.	″
Δ ρ at	4 8	0.06
Δ ρ at	4 8	0.00

AUGUST 31, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus	. .	. .	56.0	. .	. .	3 45 55.98	—3.45			28.077	47.4	45.5
2	Bessel . . . 273	. .	. .	. .	. .	. .	. . . .	+4.54	. . .	—7.99	Ther. att. 52°.1		

Remarks.

There was never an image which could be measured within 2″, the planet appearing as if floating in disturbed mercury up to 4*h*. sid. time. Star not visible under illumination until the planet had passed out of the field. Gave up the attempt to measure in despair.

SEPTEMBER 1, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 273	. .	57.5	9.5	21.5	. .	3 57 9.50	+3.22			28.180	40.8	38.2
2	Venus . . . S.F.	10.0	22.7	34.6	47.2	59.5	3 59 34.80	—5.13	+2 25.30	—8.35			
3	Bessel . . . 273	16.0	. .	41.5	53.5	. .	4 2 41.08	+4.17			Ther. att. 53°.1 Bar. red. to 32° F. 28.118		
4	Venus . . . N.F.	41.7	53.8	6.5	19.5	31.2	4 5 6.54	—6.10	2 25.46	10.27			
5	Bessel . . . 273	. .	46.8	. .	12.5	. .	4 7 59.67	+4.70½					
6	Venus . . . S.F.	1.0	13.0	25.3	38.2	50.0	4 10 25.50	—3.85	2 25.83	8.55½			
7	Bessel . . . 273	40.5	53.0	5.0	18.5	. .	4 14 5.37	+4.97					
8	Venus . . . N.F.	7.5	20.3	32.5	45 5	57.8	4 16 32.72	—5.33	2 27.35	10.30			
9 *a*	Bessel . . . 273	. .	2.5	14.0	26.5	. .	4 19 14.33	+5.84					
10	Venus . . . S.F.	16.5	29.0	41.5	54.5	6.5	4 21 41.60	—2.45	2 27.27	8.29			
11 *b*	Bessel . . . 273	. .	32.0	44.0	. .	8.6	4 25 44.11	+7.16					
12	Venus . . . N.F.	47.5	0.0	12.3	25.0	36.8	4 28 12.32	—3.34½	+2 28.21	—10.50½			

Remarks.

Quite sharp and steady images; and the observations might have been commenced earlier, but that the oil was so congealed the lamps would not burn.

a Good measures. *b* Good measures. Daylight.

Diameter of Venus from a mean of 6 measures, at 4*h*. 42*m*. sid. time, 1.868 rev. Corrected diameter, 34″.21.

Results.

		h. m. s.
Mean S. F. . . .	Three transits . . .	4 10 33.97
Mean N. F. . . .	Three transits . . .	4 16 37.19

m. s.	Rev.	′ ″
+2 26.13	— 8.398	= 2 43.68
+2 27.01	— 10.358	= 3 21.88

	m. s.
Correction for chronometer at 4 11 (h. m.) . . .	+ 2 6.11
Correction for chronometer at 4 17 . . .	+ 2 6.10

	h. m. s.
Santiago sid. time S. F.	4 12 40.08
Santiago sid. time N. F.	4 18 43.29
Interval	6 3.21

	″
Δ N. S. limbs micr. in rev.	1.960 = 38.20
Variation of declination in 6*m*. 3*s*. . .	+ 0.05
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	36.05

h. m.	″
Δ ρ at 4 11	0.26
Δ ρ at 4 17	0.29

SEPTEMBER 2, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 273	. .	. .	. .	44.5	56.0	3 33 31.89	+4.41			28.140	38.1	37.8
2	Venus . . . S.F.	10.1	23.3	35.5	48.0	0.3	3 38 35.44	—2.71	+5 3.55	—7.12			
3	Bessel . . . 273	. .	35.0	47.5	0.5	12.5	3 41 47 75	+4.78			Ther. att. 50°.7 Bar. red. to 32° F. 28.085		
4	Venus . . . N.F.	27.5	40.0	52.5	5.0	17.5	3 46 52.50	—4.36	5 4.75	9.14			
5	Bessel . . . 273	55.0	7.8	20.0	33.0	45.5	3 50 20.26	+5.61					
6	Venus . . . S.F.	0.8	13.2	26.0	39.3	51.0	3 55 26.06	—1.65	5 5.80	7.26			
7 *a*	Bessel . . . 273	30.6	43.0	55.0	8.0	20.2	3 57 55.36	+6.37					
8	Venus . . . N.F.	37.5	50.1	2.5	15.4	27.5	4 3 2.60	—2.85½	+5 7.24	—9.22½			

SEPTEMBER 2, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
9	Bessel . . . 273	. .	7.0	19.5	32.0	44.0	4 8 19.50	+2.96			28.140	38.1	37.8
10	Venus . . . S.F.	2.5	15.0	27.5	40.4	52.5	4 13 27.58	—4.19	+5 8.08	—7.15			
11	Bessel . . . 273	43.5	55.5	8.0	21.0	33.0	4 16 8.20	+4.21			Ther. att. 50°.7 Bar. red. to 32° F. 28.085		
12	Venus . . . N.F.	52.0	4.5	16.5	29.5	41.5	4 21 16.80	—4.96	5 8.60	9.17			
13 *b*	Bessel . . . 273	31.0	43.5	56.0	8.5	21.0	4 24 56.00	+5.10½					
14	Venus . . . S.F.	41.0	53.5	6.0	18.8	30.6	4 30 5.98	—2.25	5 9.98	7.35½			
15	Bessel . . . 273	. .	50.2	3.0	15.5	27.5	4 37 2.93	+6.33½					
16	Venus . . . N.F.	49.6	2.0	14.5	27.3	39.0	4 42 14.48	—2.89	+5 11.55	—9.22½			

Remarks.

Blurred and unsteady images during the first three measures.

a Sharp and good. *b* Daylight.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean S. F. . . .	Four transits . .	4 4 23.76	+5 6.85	—7.221	=2 20.74
Mean N. F. . . .	Four transits . .	4 13 21.59	+5 8.03	—9.190	=2 59.12

	h. m.	m. s.
Correction for chronometer at	4 4	+2 8.55
Correction for chronometer at	4 13	+2 8.56

	h. m. s.
Santiago sid. time S. F.	4 6 32.31
Santiago sid. time N. F.	4 15 30.15
Interval	8 57.84

	″
Δ N. S. limbs micr. in rev. . . . . . 1.969 =	38.38
Variation of declination in 8*m*. 58*s*. . .	+ 0.20
Corr. for diam. of micr. wires . . .	— 2.20
Observed N. S. diameter	36.38

	h. m.	″
Δ ρ at	4 4	0.26
Δ ρ at	4 13	0.29

SEPTEMBER 3, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1 *a*	Venus . . . N.F.	27.5	40.0	52.5	4.5	16.5	3 41 52.20	+3.52			28.119	47.7	46.0
2	H. C. . . . 16068	30.5	44.0	56.0	8.5	21.0	3 45 56.00	—9.17	—4 3.80	+12.69			
3	Venus . . . S.F.	24.5	37.2	49.6	2.8	15.2	3 49 49.86	+5.77			Ther. att. 55°.2 Bar. red. to 32° F. 28.051		
4	H. C. . . . 16068	26.5	. .	. .	. .	. .	3 53 51.00	—8.89	4 1.14	14.66			
5	Venus . . . N.F.	. .	16.2	28.8	41.0	. .	3 58 28.67	+4.84					
6	H. C. . . . 16068	5.0	17.5	30.0	43.0	54.5	4 2 30.00	—7.95	4 1.33	12.79			
7 *b*	Venus . . . S.F.	31.5	42.5	55.0	8.5	19.7	4 4 55.44	+7.37½					
8	H. C. . . . 16068	31.5	. .	56.0	10.3	21.0	4 8 56.64	—7.27½	4 1.20	14.65			
9	Venus . . . N.F.	1.7	14.5	26.5	40.0	51.5	4 11 26.84	+6.06½					
10	H. C. . . . 16068	2.5	15.5	27.5	41.2	52.0	4 15 27.74	—6.72	4 0.90	12.78½			
11	Venus . . . S F.	29.5	41.8	54.0	7.5	19.2	4 17 54.40	+8.54½					
12	H. C. . . . 16068	29.7	42.0	54.3	8.5	19.5	4 21 54.80	—6.04	—4 0.40	+14.58½			

SEPTEMBER 3, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
13 *c*	Venus . . . N.F.	54.5	6.5	19.0	32.5	43.5	4 24 19.20	+ 7.32			28.119	47.7	46.0
14	H. C. . . . 16068	53.5	6.5	18.5	32.5	43.0	4 28 18.80	— 5.48½	—3 59.60	+12.80½			
15 *d*	Venus . . . S.F.	32.0	44.3	56.5	10.5	21.5	4 30 56.96	+ 9.78			Ther. att. 55°.2 Bar. red. to 32° F. 28.051		
16 *e*	H. C. . . . 16068	30.5	43.0	55.3	9.5	20.5	4 34 55.76	— 4.93	3 58.80	14.71			
17	Venus . . . N.F.	. .	. .	33.5	47.6	58.5	4 36 34.28	+ 8.59					
18	H. C. . . . 16068	6.7	19.5	32.0	46.0	56.2	4 40 32.08	— 4.33	3 57.80	12.92			
19	Venus . . . S.F.	. .	3.2	15.3	29.0	40.2	4 42 15.80	+10.96½					
20	H. C. . . . 16068	47.5	0.5	12.5	26.5	37.0	4 46 12.80	— 3.73	—3 57.00	+14.69½			

Remarks.

Images not very sharp, though the measures have generally been satisfactory. Lalande's magnitudes are full 1 greater than Bessel's.

a Recorded 50.5*s*. at wire C.

b A hair was found on the inner lens of the eye-piece, holding wire D out of place.

c Tolerably sharp.

d Daylight.

e Recorded 19.5*s*. at wire E.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. F. . . .	Five transits . . .	4 10 32.16	— 4 0.65 . . .	+ 12.798	= 4 9.43
Mean S. F. . . .	Five transits . . .	4 17 10.49	— 3 59.71 . . .	+ 14.660	= 4 45.72

	h. m. s.
Correction for chronometer at 4 11 . . .	+ 2 11.31
Correction for chronometer at 4 17 . . .	+ 2 11.32

	h. m. s.
Santiago sid. time N. F.	4 12 43.47
Santiago sid. time S. F.	4 19 21.81
Interval	6 38.34

	″
Δ N. S. limbs micr. in rev. . . . . . . 1.862 =	36.29
Variation of declination in 6*m*. 38*s*. . .	— 0.26
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	33.83

h. m.	″
Δ ρ at 4 15	0.41
Δ ρ at 4 21	0.43

SEPTEMBER 6, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Venus . . . N.F.	1.3	13.5	25.9	38.1	50.5	4 2 25.86	—6.36			28.156	39.0	38.1
2	Bessel . . . 273	43.5	. .	7.6	20.0	32.5	4 4 7.84	6.42	—1 41.98	+0.06			
3	Venus . . . S.F.	6.8	19.1	31.5	43.0	56.0	4 6 31.28	4.00			Ther. att. 52°.9 Bar. red. to 32° F. 28.094		
4	Bessel . . . 273	48.6	0.5	13.0	25.3	38.0	4 8 13.08	5.93½	1 41.80	1.93½			
5	Venus . . . N.F.	40.0	52.5	4.7	17.0	29.5	4 10 4.74	5.37					
6	Bessel . . . 273	21.5	33.5	45.7	57.7	10.5	4 11 45.78	5.58	1 41.04	0.21			
7	Venus . . . S.F.	26.5	38.6	51.0	3.0	15.8	4 13 50.98	3.17					
8	Bessel . . . 273	. .	20.0	31.8	44.5	. .	4 15 32.10	5.19½	1 41.12	2.02½			
9	Venus . . . N.F.	53.5	6.0	18.2	30.5	42.8	4 17 18.20	4.71					
10	Bessel . . . 273	34.0	46.5	59.0	10.5	. .	4 18 58.60	—5.00	—1 40.40	+0.29			

SEPTEMBER 6, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	Venus . . . S.F.	31.5	44.0	56.3	8.4	21.0	4 21 56.24	—2.38			28.156	39.0	38.1
12	Bessel . . . 273	11.7	23.8	36.0	49.0	1.5	4 23 36.40	4.42	—1 40.16	+2.04			
13	Venus . . . N.F.	9.5	23.0	34.0	46.3	59.0	4 25 34.36	3.86			Ther. att. 52°.9		
14	Bessel . . . 273	49.0	1.2	13.6	25.8	38.2	4 27 13.56	4.19½	1 39.20	0.33½	Bar. red. to 32° F.		
15	Venus . . . S.F.	34.5	47.0	59.3	11.3	23.6	4 28 59.14	1.72			28.094		
16	Bessel . . . 273	13.5	25.5	38.0	51.0	3.0	4 30 38.20	3.65	1 39.06	1.93			
17	Venus . . . N.F.	24.5	37.0	49.3	1.5	14.0	4 32 49.26	3.06					
18	Bessel . . . 273	. .	15.7	28.0	40.2	52.5	4 34 27.98	3.29½	1 38.72	0.23½			
19 *a*	Venus . . . S.F.	5.3	17.7	29.8	42.0	54.5	4 36 29.86	1.05					
20	Bessel . . . 293	43.5	55.5	. .	20.0	32.5	4 38 7.87	—3.04	—1 38.01	+1.99			

Remarks.

Star excessively dim. Never a sharp or steady image.

a Daylight.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. F. . . .	Five transits . . .	4 17 38.48	—1 40.27	+0.226	=0 4.40
Mean S. F. . . .	Five transits . . .	4 21 33.50	—1 40.03	+1.984	=0 38.67

h. m.	m. s.
Correction for chronometer at 4 18 . . .	+2 18.05
Correction for chronometer at 4 22 . . .	+2 18.05

	h. m. s.
Santiago sid. time N. F.	4 19 56.53
Santiago sid. time S. F.	4 23 51.55
Interval	3 55.02

	″
Δ N. S. limbs micr. in rev.	1.758=34.26
Variation of declination in 3*m.* 55*s.* . .	— 0.33
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	31.73

h. m.	″
Δ ρ at 4 21	0.01
Δ ρ at 4 25	0.06

SEPTEMBER 7, 1852.

No. for reference.	Object.	Chronometer time of transit.					Mean of wires.	Micr.	Planet—Star.		Bar.	Thermometers.	
		A.	B.	C.	D.	E.			Δ α.	Δ δ.		Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 273	. .	2.0	15.0	26.5	38.5	3 57 14.38	—5.62½			28.124	44.9	41.6
2	Venus . . . N.F.	. .	22.5	35.0	47.0	59.0	3 58 34.75	+1.66	+1 20.37	+7.28½			
3	Bessel . . . 273	. .	. .	26.5	. .	52.0	4 4 27.02	—5.03½			Ther. att. 54°.0		
4	Venus . . . S.F.	24.3	36.5	48.5	. .	13.5	4 5 48.76	+4.21	1 21.74	9.24½	Bar. red. to 32° F. 28.059		
5	Bessel . . . 273	. .	39.5	51.5	4.0	. .	4 8 51.50	—4.41					
6	Venus . . . N.F.	49.0	1.3	13.3	25.0	38.1	4 10 13.34	+2.98½	1 21.84	7.39½			
7	Bessel . . . 273	. .	51.0	3.0	15.5	. .	4 13 3.00	—3.86					
8	Venus . . . S.F.	0.0	13.4	25.6	37.6	50.3	4 14 25.38	+5.32	1 22.38	9.18			
9	Bessel . . . 273	. .	23.5	36.5	48.0	. .	4 17 36.50	—3.62½					
10	Venus . . . N.F.	34.0	46.0	58.2	11.0	23.6	4 18 58.56	+3.75	+1 22.06	+7.37½			

SEPTEMBER 7, 1852—Continued.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
11	Bessel . . . 273	. .	23.5	36.0	. .	. .	4 21 35.77	—3.34			28.124	44.9	41.6
12	Venus . . . S.F.	33.7	46.8	59.0	11.2	23.6	4 22 58.86	+5.85	+1 23.09	+9.19			
13	Bessel . . . 273	. .	11.0	23.0	35.2	. .	4 26 23.07	—2.80			Ther. att 54°.0		
14	Venus . . . N.F.	22.2	34.5	46.8	. .	10.5	4 27 46.56	+4.63	1 23.49	7.43	Bar. red. to 32° F. 28.059		
15	Bessel . . . 273	. .	53.5	5.5	18.0	. .	4 32 5.67	—1.81					
16	Venus . . . S.F.	5.5	18.2	30.3	42.5	55.0	4 33 30.30	+7.40	+1 24.63	+9.21			

Remarks.

Planet so blurred and unsteady, and star so dimly seen through the haze, that the measures have scarcely been worth copying.

Results.

		h. m. s.	m. s.	Rev.	′ ″
Mean N. F. . .	Four transits . . .	4 13 53.40	+1 21.94 . . .	+7.371	=2 23.66
Mean S. F. . .	Four transits . . .	4 19 10.82	+1 22.96 . . .	+9.206	=2 59.42

	h. m.	m. s.
Correction for chronometer at	4 14 . .	+2 21.16
Correction for chronometer at	4 19 . .	+2 21.17

	h. m. s.
Santiago sid. time N. F.	4 16 14.56
Santiago sid. time S. F.	4 21 31.99
Interval	5 17.43

	″
Δ N. S. limbs micr. in rev.	1.835 = 35.76
Variation of declination in 5*m*. 17*s*. . .	— 0.53
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	33.03

h. m.	″
Δ ρ at 4 16	0.28
Δ ρ at 4 21	0.32

SEPTEMBER 8, 1852.

No. for reference.	Object.	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
1	Bessel . . . 273	. .	50.0	2.0	14.5	. .	3 42 2.17	+ 6.77½			28.000	47.0	43.9
2	Venus . . . S.F.	. .	7.3	20.0	31.5	. .	3 43 19.60	—10.41	+1 17.43	—17.18½			
3	Bessel . . . 273	. .	58.5	10.5	. .	. .	3 46 10.53	+ 6.74			Ther. att. 54°.0		
4	Venus . . . N.F.	. .	16.0	28.5	40.5	. .	3 47 28.33	—12.34	1 17.80	19.08	Bar. red. to 32° F. 27.935		
5	Bessel . . . 273	52.0	4.3	16.5	. .	. .	3 50 16.50	+ 7.04					
6	Venus . . . S.F.	. .	22.5	34.6	46.3	59.0	3 51 34.48	—10.30	1 17.98	17.34			
7	Bessel . . . 273	9.5	22.0	34.3	. .	. .	3 54 34.17	+ 7.27					
8	Venus . . . N.F.	. .	40.9	52.5	5.0	17.5	3 55 52.85	—11.72	1 18.68	18.99			
9	Bessel . . . 273	3.0	15.0	27.5	. .	. .	3 58 27.40	+ 7.53					
10	Venus . . . S.F.	21.5	34.0	46.5	59.0	11.2	3 59 46.44	— 9.81	1 19.04	17.34			
11	Bessel . . . 273	. .	44.0	57.0	. .	. .	4 1 56.53	+ 7.68					
12	Venus . . . N.F.	. .	4.5	16.7	29.0	41.5	4 3 16.80	—11.31	1 20.27	18.99			
13	Bessel . . . 273	41.5	54.0	6.3	. .	. .	4 7 6.17	+11.05½					
14	Venus . . . S.F.	. .	14.5	26.5	38.8	51.3	4 8 26.65	— 6.30	+1 20.48	—17.35½			

SEPTEMBER 8, 1852—Continued.

No. for reference.	Object..	Chronometer time of transit. A.	B.	C.	D.	E.	Mean of wires.	Micr.	Planet—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Wet.
		s.	s.	s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°
15	Bessel . . . 273	22.7	35.3	47.6	. .	. .	4 11 47.44	+11.46			28.000	47.5	43.6
16	Venus . . . N.F.	44.0	56.5	8.5	20.5	33.0	4 13 8.50	— 7.53	+1 21.06	—18.99			
17	Bessel . . . 273	17.5	30.3	42.3	. .	. .	4 15 42.27	+11.62			Ther. att. 54°.0 Bar. red. to 32° F. 27.935		
18	Venus . . . S.F.	39.5	52.0	4.3	16.5	28.8	4 17 4.22	— 5.59	1 21.95	17.21			
19	Bessel . . . 273	28.0	40.5	52.5	. .	. .	4 20 52.57	+12.21½					
20	Venus . . . N.F.	. .	2.5	15.0	26.5	39.5	4 22 14.75	— 6.86	1 22.18	19.07½			
21	Bessel . . . 273	21.5	34.3	46.4	. .	. .	4 24 46.31	+12.60					
22	Venus . . . S.F.	44.0	56.5	9.0	20.6	33.5	4 26 8.72	— 4.69	1 22.41	17.29			
23	Bessel . . . 273	13.5	25.8	38.0	. .	. .	4 28 38.01	+12.86					
24	Venus . . . N.F.	36.5	49.0	1.2	13.2	25.5	4 30 1.08	— 6.09½	1 23.07	18.95½			
25	Bessel . . . 273	19.5	32.5	44.6	. .	. .	4 32 44.44	+13.24					
26	Venus . . . S.F.	43.0	56.0	8.0	20.3	32.6	4 34 7.98	— 3.92	1 23.54	17.16			
27	Bessel . . . 273	59.5	12.5	24.6	. .	. .	4 37 24.44	+13.65½					
28	Venus . . . N.F.	24.3	36.5	48.5	1.5	13.5	4 38 48.86	— 5.36½	1 24.42	19.02			
29 *a*	Bessel . . . 273	38.0	51.0	. .	. .	. .	4 42 2.97	+14.01					
30	Venus . . . S.F.	3.3	15.5	28.0	40.3	52.5	4 43 27.92	— 3.09	1 24.95	17.10			
31	Bessel . . . 273	16.8	29.5	41.5	. .	. .	4 45 41.51	+14.30					
32	Venus . . . N.F.	42.3	55.5	7.5	19.5	32.0	4 47 7.36	— 4.53½	1 25.85	18.83½			
33	Bessel . . . 273	39.6	52.1	4.4	. .	. .	4 49 4.27	+14.61					
34	Venus . . . S.F.	5.5	17.5	30.3	42.2	54.7	4 50 30.04	— 2.60	1 25.77	17.21			
35	Bessel . . . 273	18.5	31.0	43.4	. .	. .	4 52 43.21	+14.92½					
36	Venus . . . N.F.	45.0	57.3	9.5	21.5	34.3	4 54 9.52	— 3.92	1 26.31	18.84½			
37	Bessel . . . 273	57.5	10.0	23.0	. .	. .	4 57 22.41	+15.23½					
38	Venus . . . S.F.	24 7	37.0	49.3	1.5	14.0	4 58 49.30	— 1.91	1 26.89	17.14½			
39	Bessel . . . 273	. .	22.0	33.5	. .	. .	4 59 33.86	+15.43					
40	Venus . . . N.F.	35.5	48.0	0.5	12.7	25.3	5 1 0.40	— 3.32	+1 26.54	—18.75			

Remarks.

Sharp images after the second measure, though wavy in motion throughout.

a Daylight.

Results.

		h. m. s.
Mean S. F. . . .	Ten transits . . .	4 21 19.53
Mean N. F. . . .	Ten transits . . .	4 25 24.84

	m. s.	Rev.	′ ″
	+1 22.04	—17.233	= 5 35.87
	+1 22.62	—18.953	= 6 9.39

	h. m.	m. s.
Correction for chronometer at	4 21 . . .	+2 23.75
Correction for chronometer at	4 25 . . .	+2 23.75

	h. m. s.
Santiago sid. time S. F.	4 23 43.28
Santiago sid. time N. F.	4 27 48.59
Interval	4 5.31

	″
Δ N. S. limbs micr. in rev. . . . . . . 1.720 =	33.52
Variation of declination in 4*m*. 5*s*.	+ 0.50
Corr. for diam. of micr. wires	— 2.20
Observed N. S. diameter	31.82

	h. m.	″
Δ ρ at	4 23	0.60
Δ ρ at	4 27	0.63

MARS AND VENUS, 1850–52.

OBSERVATIONS

WITH

THE MERIDIAN CIRCLE,

AT THE

OBSERVATORY, SANTIAGO DE CHILE,

BY THE U. S. NAVAL ASTRONOMICAL EXPEDITION.

OPPOSITION OF MARS, 1851-52.

MERIDIAN CIRCLE OBSERVATIONS.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A.R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1851.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Dec. 19	Anon	9 6 55.42	+1.388	+28.61	9 7 25.42	306 43 26.18	−1 12.71	− 7.8	. .	+19 51 28.44	G.
2 *a*		Mars . . . . S.F.	9 8 39.18	1.389	28.61	9 9 9.18	306 40 40.08	1 12.83	. .	−5.7	19 54 20.36	
3	21	Mars . . . . S.F.	9 8 4.46	1.393	32.06	9 8 37.91	306 32 34.92	1 13.57	+14.3	5.8	20 2 4.26	G.
4 *b*		Bessel . . . 275	9 9 48.11	1.429	32.06	9 10 21.60	306 32 11.72	1 13.58	. .	. .	+20 2 21.67	
5		*α* Hydræ	9 19 46.10	.535	32.07	9 20 18.71	334 34 52.43	25.96	. .	. .	− 8 1 6.66	
6	22	Mars . . . . S.F.	9 7 41.87	1.393	33.75	9 8 17.01	306 28 24.27	1 12.24	10.9	5.8	+20 6 16.98	G.
7 *c*		Bessel . . . 275	9 9 46.26	1.390	33.75	9 10 21.40	306 32 16.93	1 12.07	. .	. .	+20 2 18.38	
8		*α* Hydræ	9 19 44.37	.539	32.76	9 20 18.67	334 34 58.20	25.43	. .	. .	− 8 1 9.56	
9 *d*	24	Mars . . . . S.F.	9 6 46.88	1.543	37.20	9 7 25.62	306 19 18.15	1 13.34	10.6	5.9	+20 15 24.60	G.
10 *d*	25	Mars . . . . S.F.	9 6 14.18	1.403	39.26	9 6 54.84	306 14 27.10	1 12.93	12.2	6.0	20 20 13.74	G.
11 *e*	26	Mars . . . . S.F.	9 5 37.71	1.565	41.12	9 6 20.40	306 9 20.68	1 12.66	10.1	6.0	20 25 21.99	G.
12 *f*		Rumker . . . 2800	9 7 0.07	+1.604	41.12	9 7 42.79	306 6 55.48	−1 12.77	. .	. .	+20 27 41.30	
13		*ι* Argus	9 12 30.28	−2.309	41.13	9 13 9.09	25 12 7.50	+ 25.05	. .	. .	−58 39 8.54	
14		*α* Hydræ	9 19 37.14	+ .567	+41.14	9 20 18.85	334 34 56.10	− 25.28	. .	. .	− 8 1 6.81	
15	27	Mars . . . . S.F.	9 5 59.50	1.476	−18.23	9 5 42.75	306 4 5.00	1 13.60	8.7	6.1	+20 30 40.11	G.
16 *g*		Rumker . . . 2800	9 8 0.02	+1.513	18.23	9 7 43.30	306 7 1.50	−1 13.47	. .	. .	+20 27 37.38	
17		*ι* Argus	9 13 30.28	−2.628	18.23	9 13 9.42	25 12 6.20	+ 25.28	. .	. .	−58 39 6.07	
18		*α* Hydræ	9 20 36.73	+ .435	18.23	9 20 18.94	334 34 58.00	− 25.53	. .	. .	− 8 1 7.06	
19	28	Mars . . . . S.F.	9 5 17.11	+2.041	17.78	9 5 1.37	305 58 43.92	−1 14.29	0.4	6.1	+20 36 10.18	G.
20		*ι* Argus	9 13 28.83	−1.553	17.78	9 13 9.50	25 12 15.48	+ 25.54	. .	. .	−58 39 7.21	
21		*α* Hydræ	9 20 35.61	+ .999	17.77	9 20 18.84	334 35 7.98	− 25.68	. .	. .	− 8 1 8.56	
22	30	Mars . . . . S.F.	9 3 42.98	1.798	15.47	9 3 29.31	305 46 57.65	1 14.55	8.7	6.2	+20 47 48.51	G.
23 *h*		Rumker . . . 2799	9 7 54.21	+1.793	15.47	9 7 40.53	305 53 33.75	−1 14.25	. .	. .	+20 41 5.91	
24		*ι* Argus	9 13 26.51	−1.689	15.46	9 13 9.35	25 12 7.42	+ 25.35	. .	. .	−58 39 7.36	
25		*α* Hydræ	9 20 33.50	+ .891	15.45	9 20 18.94	334 34 58.38	− 25.59	. .	. .	− 8 1 7.38	
26	31	Mars . . . . S.F.	9 2 50.96	1.767	14.44	9 2 38.29	305 40 52.18	1 14.18	9.1	−6.3	+20 53 53.31	G.
27 *i*		Bessel . . . 277	9 3 32.90	+1.807	14.44	9 3 20.27	305 37 21.05	−1 14.35	. .	. .	+20 57 18.28	
28		*ι* Argus	9 13 25.80	−1.833	14.43	9 13 9.54	25 12 9.38	+ 25.13	. .	. .	−58 39 9.50	
29		*α* Hydræ	9 20 32.56	+ .851	14.42	9 20 18.99	334 35 0.78	− 25.37	. .	. .	− 8 1 10.40	
	1852.											
30	Jan. 1	Mars . . . . N.F.	9 1 55.20	1.888	13.16	9 1 43.93	305 34 17.00	1 14.42	+10.4	+6.3	+21 0 14.83	G.
31 *k*		Bessel . . . 277	9 3 30.94	+1.927	−13.16	9 3 19.71	305 32 55.70	−1 14.49	. .	. .	+21 1 42.50	

a Mars north of star, 5.95 rev. = 2′ 46″.10.
b Bessel 275, north of Mars, 0.83 rev. = 23″.20.
c Observed with micr. Bessel 275. 8.33 rev. south = 3′ 52″.66.
d d Comparing star would not bear sufficient illumination to render the wires visible.
e After this day's observations shortened the pendulum two divs. and advanced the clock one minute.

f Observed with micr. Rumker 2800, 5.20 rev. north = 2′ 25″.20.
g Rumker 2800, south of Mars, 6.32 rev. = 2′ 56″.50. So dim that it is mere guess work.
h Rumker, 3d wire south, 5.10 rev. = 6′ 36″.10.
i Bessel 277, north of Mars, 7.56 rev. = 3′ 31″.13. Recorded *south* of Mars.
k Bessel 277, north of Mars S. F., 2 91 rev. = 1′ 21″.30.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A.R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Jan. 1	ι Argus	9 13 24.86	−2.281	−13.15	9 13 9.43	25 12 6.18	+ 25.11	+10.4	. .	−58 39 7.58	G.
2		α Hydræ	9 20 31.24	+ .824	13.15	9 20 18.91	334 35 0.45	− 25.35	. .	. .	− 8 1 11.39	
3	2	Bessel . . . 275	8 58 26.53	+1.885	12.12	8 58 16.30	305 28 23.65	1 14.87	6.9	. .	+21 6 18.43	G.
4 a		Mars . . . . N.P.	9 0 55.70	+1.847	12.12	9 0 45.43	305 28 4.95	−1 14.88	. .	+6.3	+21 6 30.84	
5		ι Argus	9 13 23.34	−1.648	12.11	9 13 9.58	25 12 9.78	+ 25.17	. .	. .	−58 39 7.74	
6		α Hydræ	9 20 30.21	+ .990	12.10	9 20 19.10	334 35 3.10	− 25.40	. .	. .	− 8 1 10.49	
7	4	Mars . . . . N.P.	8 58 49.43	1.735	10.23	8 58 40.94	305 14 53.88	1 16.28	5.4	6.4	+21 19 44.71	G.
8 b		H. C. 18132	9 4 25.30	+1.733	10.23	9 4 16.80	305 17 55.48	−1 16.14	. .	. .	+21 16 49.37	
9		ι Argus	9 13 21.18	−1.416	10.22	9 13 9.54	25 12 8.55	+ 25.43	. .	. .	−58 39 5.27	
10		α Hydræ	9 20 28.34	+ .828	10.22	9 20 18.95	334 35 0.82	− 25.67	. .	. .	− 8 1 6.44	
11	5	B. A. C. . . . 3017	8 45 34.63	1.707	9.30	8 45 27.04	306 3 20.10	1 13.48	5.5	. .	+20 31 21.99	G.
12		Mars . . . . N.P.	8 57 41.54	1.735	9.29	8 57 33.99	305 8 14.92	1 16.00	. .	+6.4	21 26 23.29	
13 c		Bessel . . . 278	8 59 34.83	+1.774	9.29	8 59 27.31	305 5 28.87	−1 16.13	. .	. .	+21 29 15.87	
14		ι Argus	9 13 20.43	−1.416	9.28	9 13 9.73	25 12 11.58	+ 25.23	. .	. .	−58 39 8.20	
15		α Hydræ	9 20 27.43	+ .924	9.27	9 20 19.08	334 35 3.28	− 25.47	. .	. .	− 8 1 9.20	
16	6	Bessel . . . 278	8 53 52.43	3.090	8.07	8 53 47.45	305 0 36.70	1 15.14	5.9	. .	+21 34 6.65	G.
17 d		Mars . . . . S.F.	8 56 30.40	3.089	8.07	8 56 25.42	304 1 28.10	1 15.10	. .	−6.5	21 33 21.71	
18 e		Greenwich . . 489	8 59 20.24	+3.093	8.06	8 59 15.27	304 58 37.70	−1 15.20	. .	. .	+21 36 5.71	
19		ι Argus	9 13 20.77	−3.041	8.05	9 13 9.68	25 12 10.88	+ 24.83	. .	. .	−58 39 7.50	
20		α Hydræ	9 20 25.71	+1.492	8.05	9 20 19.15	334 35 1.78	− 25.07	. .	. .	− 8 1 8.50	
21	7	Bessel . . . 278	8 50 33.21	.954	8.41	8 50 25.75	304 50 31.10	1 16.94	12.4	. .	+21 44 7.55	G.
22		Mars . . . . S.P.	8 55 19.10	.951	8.42	8 55 11.63	304 54 26.25	1 16.75	. .	−6.5	21 40 18.71	
23 f		Greenwich . . 489	8 59 22.96	+ .988	8.42	8 59 15.53	304 58 32.55	−1 16.51	. .	. .	+21 36 5.67	
24		ι Argus	9 13 19.47	−1.410	8.42	9 13 9.64	25 12 5.82	+ 25.27	. .	. .	−58 39 9.38	
25		α Hydræ	9 20 27.18	+ .339	8.42	9 20 19.10	334 34 57.48	− 25.51	. .	. .	− 8 1 10.26	
26	8	Bessel . . . 278	8 50 33.87	.942	9.07	8 50 25.74	304 50 26.58	1 17.39	14.8	. .	+21 44 10.12	G.
27 g		Mars . . . . N.P.	8 54 4.18	.940	9.07	8 53 56.05	304 47 4.83	1 17.55	. .	+6.5	+21 47 25.53	
28		α Hydræ	9 20 27.84	.365	9.08	9 20 19.13	334 34 56.28	25.66	. .	. .	− 8 1 11.31	
29	9	Bessel . . . 278	8 49 3.58	.697	9.67	8 48 54.61	304 39 43.58	1 17.56	12.9	. .	+21 54 55.19	G.
30 h		Mars . . . . S.F.	8 52 48.13	+ .697	9.67	8 52 39.16	304 40 13.33	−1 17.54	. .	−6.5	+21 54 31.92	
31		ι Argus	9 13 20.34	−1.020	9.68	9 13 9.64	25 12 4.65	+ 25.30	. .	. .	−58 39 8.74	
32		α Hydræ	9 20 28.53	+ .256	9.68	9 20 19.11	334 34 57.35	− 25 54	. .	. .	− 8 1 10.60	
33	10	Mars . . . . N.P.	8 51 26.77	.938	10.12	8 51 17.59	304 32 46.75	1 17.32	14.2	+6.6	+22 1 43.88	G.
34 i		Bessel . . . 278	8 52 22.62	+ .938	10.12	8 52 13.44	304 32 10.15	−1 17.35	. .	. .	+22 2 27.11	
35		ι Argus	9 13 21.06	−1.160	10.13	9 13 9.77	25 12 5.20	+ 25.12	. .	. .	−58 39 10.41	
36		α Hydræ	9 20 28.94	+ .366	10.13	9 20 19.18	334 34 58.40	− 25.36	. .	. .	− 8 1 13.13	
37 k	11	Bessel . . . 278	8 47 42.77	+0.745	10.42	8 47 33.10	304 25 56.40	1 18.49	+13.5	. .	+22 8 42.70	G.
38 l		Mars . . . . N.F.	8 50 5.04	.745	10.42	8 49 55.37	304 25 33.80	1 18.51	. .	+6.6	22 8 58.72	
39 m		H. C. 17818	8 54 24.30	+ .744	10.42	8 54 14.62	304 28 29.16	−1 18.26	. .	. .	+22 6 9.71	
40		ι Argus	9 13 21.34	−1.136	10.43	9 13 9.77	25 12 6.58	+ 25.39	. .	. .	−58 39 11.36	
41		α Hydræ	9 20 29.40	+ .254	10.43	9 20 19.22	334 34 58 45	− 25.63	. .	. .	− 8 1 12.21	
42 n	12	Mars . . . . S.P.	8 48 38.95	+ .622	11.02	8 48 28.55	304 18 50.80	−1 18.68	− 0.5	−6.6	+22 16 9.09	G.
43		ι Argus	9 13 22.10	−1.233	11.03	9 13 9.84	25 12 19.00	+ 25.33	. .	. .	−58 39 9.72	
44		α Hydræ	9 20 30.10	+ .207	−11.04	9 20 19.27	334 35 8.03	− 25.57	. .	. .	− 8 1 7.87	

	Rev. ′ ″
a Mars N. P. north of Bessel 275	0.67 = 0 18.70
b H. C. 18132 south of Mars N. P.	6.50 = 3 1.60
c Bessel 278 north of Mars N. P.	5.94½ = 2 46.05
d Mars S. F. south of Bessel 278	1.84 = 0 51.40
e Greenwich 489 north of Bessel 278	4.26 = 1 59.00
f Greenwich 489 south of Mars S. P.	8.82 = 4 6.30
g Mars N. P. north of Bessel 278	7.22½ = 3 21.75

	Rev. ″
h Mars S. F. south of Bessel 278	1.06½ = 29.75
i Bessel 278 north of Mars N. P.	1.31 = 36.60

k All the wires, except the stationary and No. 4 horizontal, were found to be in wavy lines.

l Mars N. F. north of Bessel 278, 0.81 rev. = 22″.60.

m H. C. 17818 south of Bessel 278, 5.47¼ rev. = 2′ 32″.85.

n Put new systems of wires in the meridian circle diaphragms.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Jan. 13	Bessel . . . 278	8 46 9.14	+0.662	−11.53	8 45 58.27	304 12 10.78	−1 20.00	+ 0.8	. .	+22 22 42.53	G.
2 *a*		Mars . . . . N.P.	8 47 11.59	+ .603	11.53	8 47 0.66	304 11 16.39	−1 20.04	. .	+6.6	+22 23 30.36	
3		ι Argus	9 13 22.60	−1.290	11.54	9 13 9.77	25 12 18.55	+ 25.65	. .	. .	−58 39 10.89	
4		α Hydræ	9 20 30.56	+ .177	11.54	9 20 19.20	334 35 9.00	− 25.89	. .	. .	− 8 1 9.80	
5	14	γ Cancri	8 34 54.60	.633	11.93	8 34 43.30	304 35 6.68	1 16.90	− 0.7	. .	+21 59 45.03	G.
6		Bessel . . . 278	8 44 26.85	.566	11.94	8 44 15.48	304 0 58.25	1 18.55	. .	. .	22 33 55.11	
7 *b*		Mars . . . . S.F.	8 45 43.21	+ .583	11.94	8 45 31.85	304 4 25.25	−1 18.38	. .	−6.7	+22 30 34.64	
8		ι Argus	9 13 23.21	−1.459	11.94	9 13 9.81	25 12 21.38	+ 25.01	. .	. .	−58 39 11.58	
9		α Hydræ	9 20 31.08	+ .143	11.94	9 20 19.28	334 35 9.20	− 25.30	. .	. .	− 8 1 9.09	
10 *c*	15	γ Cancri	8 34 54.73	.725	12.29	8 34 43.17	304 35 8.92	1 17.62	1.7	. .	+21 59 44.51	G.
11		Mars . . . . N.P.	8 44 10.53	+ .737	12.29	8 43 58.98	303 56 54.72	−1 19.49	. .	+6.7	+22 37 53.88	
12		ι Argus	9 13 23.56	−1.508	12.30	9 13 9.75	25 12 25.22	+ 25.25	. .	. .	−58 39 14.66	
13		α Hydræ	9 20 31.23	+ .169	12.30	9 20 19.10	334 35 11.78	− 25.49	. .	. .	− 8 1 10.48	
14	16	Mars . . . . S.F.	8 42 38.50	.769	12.70	8 42 26.57	303 49 59.78	1 19.31	3.0	−6.7	+22 45 3.34	G.
15 *d*		H. C. 17528	8 45 56.90	+ .771	12.70	8 45 44.97	303 48 21.78	−1 19.39	. .	. .	+22 46 34.72	
16		ι Argus	9 13 23.84	−1.421	12.71	9 13 9.71	25 12 24.38	+ 25.08	. .	. .	−58 39 12.35	
17		α Hydræ	9 20 31.68	+ .214	12.71	9 20 19.18	334 35 11.05	− 25.32	. .	. .	− 8 1 8.62	
18	17	32 Cancri	8 24 27.11	.875	12.86	8 24 15.13	303 0 0.65	1 21.36	− 2.1	. .	+23 34 56.92	G.
19		Mars . . . . N.P.	8 41 2.23	.860	12.86	8 40 50.23	303 42 38.58	1 19.35	. .	+6.7	22 52 10.28	
20 *e*		H. C. 17513	8 45 40 48	+ .860	12.86	8 45 28.48	303 43 19.08	−1 19.32	. .	. .	+22 51 36.46	
21		ι Argus	9 13 24.21	−1.570	12.87	9 13 9.77	25 12 22.68	+ 24.98	. .	. .	−58 39 11.45	
22		α Hydræ	9 20 31.86	+ .239	12.87	9 20 19.23	334 35 9.55	− 25.19	. .	. .	− 8 1 8.15	
23	18	32 Cancri	8 24 27.26	.869	12.90	8 24 15.23	302 59 58.90	1 21.98	+ 0.9	. .	+23 34 56.29	G.
24		Mars . . . . S.F.	8 39 26.97	+ .858	12 90	8 39 14.93	303 35 54.70	−1 20.31	. .	−6.7	+22 59 5.52	
25		ι Argus	9 13 24.28	−1.587	12.90	9 13 9.79	25 12 21.50	+ 25.18	. .	. .	−58 39 13.47	
26		α Hydræ	9 20 31.93	+ .230	12.90	9 20 19.26	334 35 10.00	− 25.47	. .	. .	− 8 1 11.32	
27	19	λ Cancri	8 11 56.48	.879	13.21	8 11 44.15	302 5 57.68	1 24.47	+ 1.3	. .	+24 28 59.60	G.
28 *f*		32 Cancri	8 24 27.56	.881	13.21	8 24 15.23						
29		W. C.	8 34 55.10	.787	13.21	8 34 42.68						
30		Mars . . . . N.P.	8 37 48.27	+ .849	13.21	8 37 35.91	303 28 45.82	−1 20.35	. .	+6.7	+23 6 0.64	
31		ι Argus	9 13 24.50	−1.622	13.22	9 13 9.66	25 12 21.88	+ 25.08	. .	. .	−58 39 14.15	
32		α Hydræ	9 20 32.20	+ .211	13.22	9 20 19.19	334 35 12.62	− 25.32	. .	. .	− 8 1 14.49	
33	20	λ Cancri	8 11 57.16	.887	13.48	8 11 44.57	302 5 58.88	1 24.17	− 0.6	. .	+24 29 0.00	M.
34 *g*		Mars . . . . N.F.	8 36 11.38	.859	13.49	8 35 58.75	303 21 52.12	1 20.63	. .	+6.7	23 12 56.52	
35	21	λ Cancri	8 11 57.11	.894	13.76	8 11 44.24	302 6 1.82	1 24.91	− 0.4	. .	24 28 57.60	G.
36		v^3 Cancri	8 22 58.46	.895	13.77	8 22 45.59	302 0 27.32	1 25.22	. .	. .	24 34 32.41	
37		Mars . . . . N.P.	8 34 30.46	+ .868	13.77	8 34 17.56	303 15 11.25	−1 21.28	. .	+6.7	+23 19 37.84	
38		ι Argus	9 13 25.16	−1.579	13.77	9 13 9.81	25 12 21.35	+ 25.18	. .	. .	−58 39 12.02	
39		α Hydræ	9 20 32.80	+ .234	13.77	9 20 19.26	334 35 8.90	− 25.42	. .	. .	− 8 1 8.97	
40	22	λ Cancri	8 11 57.57	.731	13.85	8 11 44.45	302 5 57.08	1 24.87	+ 3.6	. .	+24 28 58.30	P.
41		v^3 Cancri	8 22 58.88	.733	13.85	8 22 45.76	302 0 25.02	1 25.17	. .	. .	24 34 30.66	
42		Mars . . . . S.F.	8 32 51.98	.710	13.86	8 32 38.83	303 8 55.80	1 21.64	. .	−6.7	23 26 3.05	
43	23	λ Cancri	8 11 58.00	.719	14.43	8 11 44.29	302 5 57.98	1 25.20	+ 1.0	. .	24 29 0.33	M.
44		v^3 Cancri	8 22 59.38	+ .722	−14.43	8 22 45.67	302 0 25.65	−1 25.47	. .	. .	+24 34 32.93	

a Mars N. P. north of Bessel 278, 1.94½ rev. = 54″.35.

b Mars S. F. south of Bessel 278, 7.41 rev. = 3′ 27″.00. There was, probably, an error of 1 rev. in reading the micrometer, and it should have been 6.41 rev. = 2′ 59″.01. The declination then becomes +22° 31′ 2″.63.

c Measures made with magnifying power 144, and the aperture diminished to two inches. All the observations were in the highest possible degree satisfactory.

d H. C. 17528 north of Mars S. F., 3.51 rev. = 1′ 38″.00.

e H. C. 17513 south of Mars N. P., 1.45 rev. = 40″.50.

f 32 Cancri was accidentally observed on the micrometer wire, and, therefore, its declination is not given.

g Believed to have been north following.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Jan. 23	Mars . . . . N.P.	8 31 10.63	+0.700	−14.43	8 30 56.90	303 2 12.02	−1 22.16	+ 1.0	+6.7	+23 32 36.55	M.
2	24	λ Cancri	8 11 58.46	.738	14.78	8 11 44 42	302 5 57.10	1 25.14	+ 2.0	. .	24 29 0.15	P.
3 a		v^1 Cancri	8 18 6.01	.748	14.79	8 17 51.97	301 31 0.68	1 26.91	. .	. .	25 0 58.34	
4		Bessel . . . 344	8 28 29.46	.665	14.79	8 28 15.34	302 49 19.65	1 22.84	. .	. .	23 45 35.30	
5 b		Mars . . . . S.F.	8 29 31.17	.721	14.79	8 29 17.10	302 56 12.09	1 22.48	. .	−6.7	23 38 49.20	
6	25	λ Cancri	8 11 59.14	.660	15.42	8 11 44.38	302 5 58.12	1 24.52	− 0.5	. .	24 29 1.01	G.
7 c		v^1 Cancri	8 18 6 58	.670	15.42	8 17 51.83	301 34 4.63	1 26.44	. .	. .	25 0 56.42	
8		Mars . . . . N.P.	8 27 49.84	.648	15.42	8 27 35.07	302 49 56.98	1 22.59	. .	+6.7	23 44 53.52	
9 d		Bessel . . . 344	8 28 29.93	+ .587	15.42	8 28 15.10	302 49 24.38	−1 22.62	. .	. .	+23 45 32.85	
10		ι Argus	9 13 26.80	−1.384	15.44	9 13 9.98	25 12 23.32	+ 25.19	. .	. .	−58 39 13.90	
11		α Hydræ	9 20 34.76	+ .122	15.44	9 20 19.44	334 35 10.83	− 25.43	. .	. .	− 8 1 10.79	
12	27	B. A. C. . . . 2703	7 58 6.61	.558	16.68	7 57 50.49	303 42 18.75	1 19.30	+ 0.1	. .	+22 52 34.56	M.
13		λ Cancri	8 12 0.38	.640	16.69	8 11 44.33	302 5 58.05	1 24.41	. .	. .	24 29 0.37	
14		Mars . . . . N.P.	8 24 30.60	.631	16.70	8 24 14.53	302 38 22.82	1 22.84	. .	+6.7	23 56 27.33	
15 e		W. C.	8 27 48.24	.632	16.70	8 27 32.17	302 36 49.82	1 22.92	. .	. .	23 58 7.11	
16	28	B. A. C. . . . 2703	7 58 7.21	.739	17.49	7 57 50.46	303 42 15.02	1 19.66	3.5	. .	22 52 35.25	P.
17		λ Cancri	8 12 1.10	.774	17.50	8 11 44.37	302 6 1.32	1 24.68	. .	. .	24 28 56.97	
18		H. C. . . . 16464	8 16 53.16	.710	17.50	8 16 36.37	302 33 25.30	1 23.20	. .	. .	24 1 28.51	
19		Mars . . . . S.F.	8 22 52.80	.764	17.51	8 22 36.05	302 33 12.45	1 23.26	. .	−6.7	24 1 48.12	
20	*29	B. A. C. . . . 2703	7 58 7.81	.922	18.46	7 57 50.27	303 42 19.80	1 20.77	0.4	. .	22 52 34.68	M.
21 f		Mars . . . . N.P.	8 21 13.63	+ .893	18.47	8 20 56.05	302 27 45.58	−1 24.59	. .	+6.7	+24 7 6.02	
22		ι Argus	9 13 30.16	−1.679	18 49	9 13 9.99	25 12 26.80	+ 26.07	. .	. .	−58 39 19.16	
23	30	B. A. C. . . . 2703	7 58 8.17	+1.009	18.81	7 57 50.37	303 42 16.42	1 20.11	+ 0.6	. .	+22 52 37.20	P.
24		λ Cancri	8 12 2.14	1.053	18.81	8 11 44.38	302 6 0.45	1 25.17	. .	. .	24 28 58.23	
25 g		Mars . . . . S.F.	8 19 37.39	1.045	18.81	8 19 19.54	302 22 54.82	1 24.25	. .	−6.7	24 12 9.64	
26		ε Hydræ	8 39 15.01	+ .610	18.82	8 38 56.80	319 36 51.63	− 45.67	. .	. .	+ 6 57 27.55	
27		ι Argus	9 13 30.74	−1.815	18.83	9 13 10.09	25 12 27.20	+ 25.30	. .	. .	−58 39 18.99	
28	31	B. A. C. . . . 2703	7 58 8.68	+ .739	19.26	7 57 50.16	303 42 17.78	1 19.35	− 1.2	. .	+22 52 36.88	M.
29		λ Cancri	8 12 2.61	.774	19.26	8 11 44.12	302 6 1.30	1 24.32	. .	. .	24 28 58.33	
30 h		Mars . . . . N.P.	8 18 0.41	.716	19.27	8 17 41.86	302 17 53.55	1 23.61	. .	+6.6	24 16 58.77	
31	Feb. 1	B. A. C. . . . 2703	7 58 9.00	.712	19.33	7 57 50.38	303 42 18.65	1 18.88	− 2.5	. .	22 52 36.84	G.
32		λ Cancri	8 12 2.83	.748	19.33	8 11 44.25	302 5 57.95	1 23.85	. .	. .	24 28 57.51	
33		Mars . . . . S.F.	8 16 26.27	.746	19.33	8 16 7.69	302 13 35.72	1 23.56	. .	−6.6	24 21 31.05	
34 i		Bessel . . . 344	8 16 27.71	+ .747	19.33	8 16 9.13	302 9 56.52	−1 23.75	. .	. .	+24 25 3.84	
35		ι Argus	9 13 31.03	−1.625	19.35	9 13 10.05	25 12 28.75	+ 24.95	. .	. .	−58 39 17.09	
36		α Hydræ	9 20 38.81	+ .096	19.35	9 20 19.56	334 35 14.95	− 25.18	. .	. .	− 8 1 13.16	
37	2	B. A. C. . . . 2703	7 58 9.17	.706	19.90	7 57 49.98	303 42 15.18	1 18.84	+ 2.3	. .	+22 52 35.47	M.
38		λ Cancri	8 12 3.16	.743	19.90	8 11 44.00	302 5 57.65	1 23.80	. .	. .	24 28 57.96	
39		Mars . . . . N.P.	8 14 52.18	.686	19.90	8 14 32.97	302 8 56.83	1 23.56	. .	+6.6	24 25 51.94	
40 k		Bessel . . . 344	8 16 27.89	.687	19.90	8 16 8.68	302 9 53.33	1 23.51	. .	. .	24 25 1.99	
41	3	λ Cancri	8 12 3.52	.933	20.05	8 11 44.40	302 5 56.00	1 24.03	1.7	. .	24 29 0.44	P.
42 l		Mars . . . . S.F.	8 13 21.47	.988	20.05	8 13 2.41	302 5 2.40	1 24.07	. .	−6.6	24 30 0.38	
43		v^2 Cancri	8 20 9.58	.992	20.05	8 19 50.52	301 57 3.92	1 24.50	. .	. .	24 37 52.99	
44	4	Mars . . . . N.P.	8 11 50.71	+ .774	−20.35	8 11 31.13	302 1 5.70	−1 24.81	+ 1.1	+6.5	+24 33 45.62	M.

a South, preceding star.
b Mars S.F., 6th wire, — 3.33 rev. = 6′ 52″.44.
c Double: the comparison star 8th magnitude, observed south preceding.
d Bessel 344, north of Mars N.P., 1.17 rev. = 32″.60.
e Washington, north of Mars N.P., 3.33 rev. = 1′ 33″.00.
f Diameter of Mars, 0.58 rev. = 16″.20.
g Diameter of Mars, 0.57 rev. = 15″.90.
h Diameter of Mars, 0.54 rev. = 15″.10.
i Bessel 344, north of Mars S.F., 7.85 rev. = 3′ 39″.20.
k Bessel 344, south of Mars N.P., 2.02 rev. = 56″.50.
l Mars S.F., 4th wire, — 1.92 rev. = 53″.60.
* The nadir observed evidently changed from + 3″.5; the adopted amount has been deduced from observations of standard stars on the same night.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A.R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 *a*	Feb. 4	λ Cancri	. . . . .	. .	. .	. . .	302 5 57.63	—1 24.58	+ 1.1	. .	+24 28 59.96	M.
2		υ² Cancri	8 20 9.91	+0.775	—20.35	8 19 50.34	301 57 9.25	1 25.26	. .	. .	24 37 49.02	
3		δ Cancri	8 36 36.34	.635	20.35	8 36 16.63	307 53 8.40	1 8.42	. .	. .	18 41 33.03	
4	7	Bessel 341	8 6 36.85	.721	20.97	8 6 16.60	301 47 55.53	1 24.04	0.2	. .	24 47 2.42	P.
5 *b*		Mars S.P.	8 7 34.07	.721	20.97	8 7 13 82	301 51 12.46	1 23.86	. .	—6.5	24 43 51.81	
6		υ² Cancri	8 20 10.57	.773	20.97	8 19 50.37	301 57 3.95	1 23.55	. .	. .	24 37 53.51	
7		32 Cancri	8 24 35 46	.772	20.97	8 24 15.26	301 59 53.55	1 23.37	. .	. .	24 35 3.73	
8 *c*	8	B. A. C 2703	7 58 10.28	1.231	21.55	7 57 49.96	303 42 17.15	1 18.66	1.5	. .	22 52 34.12	G.
9		Mars S.F.	8 6 13.61	1.280	21.56	8 5 53.33	301 48 24.43	1 24.57	. .	—6.4	24 46 39.15	
10 *d*		Bessel 341	. . . . .	. .	. .	. . . . .	301 48 0.43	1 24.59	. .	. .	24 46 56.77	
11		λ Cancri	8 12 4.31	1.273	21.56	8 11 44.02	302 5 57.45	1 23.62	. .	. .	24 28 58.78	
12		υ² Cancri	8 20 10.44	1.276	21.56	8 19 50.16	301 57 5.15	1 24.10	. .	. .	24 37 51.56	
13 *e*	9	B. A. C. 2703	7 58 10.63	1.218	22.04	7 57 49.81	303 42 17.13	1 13.65	1.2	. .	22 52 34.43	G.
14		Mars N.P.	8 4 54.28	1.268	22.04	8 4 33.51	301 45 33.63	1 24.71	. .	+6.4	24 49 17.59	
15 *f*		Bessel 341	8 6 36.52	1.212	22.04	8 6 15.69	301 47 59.63	1 24.57	. .	. .	24 46 57.85	
16		λ Cancri	8 12 4.57	1.260	22.05	8 11 43.78	302 5 59.88	1 23.70	. .	. .	24 28 56.73	
17		υ² Cancri	8 20 10.70	+1.263	22.05	8 19 49.91	301 57 4.80	—1 24.18	. .	. .	+24 37 52.29	
18		ι Argus	9 13 33.33	—1.468	22.07	9 13 9.79	25 12 30.20	+ 24.87	. .	. .	—58 39 22.16	
19 *g*	10	84 Geminorum	7 44 35.75	+ .616	22.53	7 44 13.84	303 52 8.00	—1 18.28	9.8	. .	+22 42 34.59	M.
20 *h*		Mars S.F.	8 3 41.11	.703	22.53	8 3 19.28	301 43 16.88	1 24.95	. .	—6.3	24 51 38.68	
21		λ Cancri	8 12 6.14	+ .697	22.54	8 11 44.30	302 5 49.58	—1 23.76	. .	. .	+24 28 58.49	
22		ι Argus	9 13 33.59	—1.017	22.56	9 13 10.01	25 12 23.28	+ 24.94	. .	. .	—58 39 23.91	
23	11	H. C. 15707	7 55 38.47	+ .723	23.06	7 55 16.13	301 39 42.05	—1 25.86	7.9	. .	+24 55 10.02	G.
24		Bessel 341	7 59 47.11	.778	23.06	7 59 24.83	301 42 12.72	1 25.71	. .	. .	24 52 39.20	
25 *i*		Mars N.P.	8 2 27.33	.778	23.06	8 2 5.05	301 40 56;32	1 25.79	. .	+6.3	24 53 49.38	
26		λ Cancri	8 12 6.68	+ .770	23.07	8 11 44.38	302 5 51.08	—1 24.45	. .	. .	+24 28 59.58	
27		ι Argus	9 13 34.37	—1.217	23.10	9 13 10.05	25 12 23.13	+ 25.09	. .	. .	—58 39 22.01	
28		α Hydræ	9 20 42.49	+ .228	23.10	9 20 19.62	334 35 5.08	— 25.33	. .	. .	— 8 1 13.54	
29	13	H. C. 15707	7 55 39.97	.476	24.29	7 55 16.16	301 39 41.45	1 25.52	9.6	. .	+24 55 8.58	G.
30		Mars N.P.	8 0 11.26	.476	24.29	7 59 47.45	301 37 23.38	1 25.65	. .	6.2	24 57 20.58	
31		λ Cancri	8 12 8.27	+ .470	24.29	8 11 44.45	302 5 49.13	—1 24.17	. .	. .	+24 28 59.55	
32		ι Argus	9 13 35.19	— .817	24.32	9 13 10.05	25 12 23.65	+ 24.99	. .	. .	—58 39 24.13	
33		α Hydræ	9 20 43.81	+ .126	24.32	9 20 19.62	334 35 6.35	— 25.23	. .	. .	— 8 1 16.61	
34	14	Bessel 341	7 55 28.71	.198	25.06	7 55 3.85	301 34 34.23	1 26.23	6.3	. .	+25 0 19.81	M.
35 *k*		H. C. 15707	7 55 40.89	.198	25.06	7 55 16.03	301 39 46.86	1 25.94	. .	. .	24 55 6.89	
36 *l*		Mars N.P.	7 59 7.73	.253	25.06	7 58 42.92	301 35 59.73	1 26.15	. .	6.2	24 58 48.03	
37		λ Cancri	8 12 9.13	+ .250	25.07	8 11 44.31	302 5 51.93	—1 24.52	. .	. .	+24 29 0.40	
38		ι Argus	9 13 35.49	— .456	25.09	9 13 9.94	25 12 27.00	+ 25.12	. .	. .	—58 39 24.31	
39	15	Bessel 341	7 55 29.08	+ .226	25.44	7 55 3.87	301 34 40.58	—1 26.33	4.7	. .	+25 0 15.16	G.
40 *m*		H. C. 15707	7 55 41.29	.226	25.44	7 55 16.08	301 39 52.71	1 26.04	. .	. .	24 55 2.74	
41 *n*		Mars N.P.	7 58 6.87	.282	25.44	7 57 41.71	301 34 52.18	1 26.32	. .	+6.2	24 59 57.35	
42		λ Cancri	8 12 9.38	.277	25.44	8 11 44.22	302 5 54.93	1 24.61	. .	. .	24 28 59.09	
43	16	Bessel 341	7 55 29.44	.250	25.82	7 55 3.87	301 34 38.90	1 26.07	+ 4.9	. .	25 0 16.38	M.
44 *o*		H. C. 15707	7 55 41.57	.250	25.82	7 55 16.00	301 39 49.03	1 25.79	. .	. .	24 55 5.97	
45 *p*		Mars S.F.	7 57 10.33	+0.253	—25.82	7 56 44.76	301 34 2.30	—1 26.11	. .	—6.1	+25 0 59.12	

a λ Cancri, 5th wire, + 1.35 rev. = 4′ 51″.93.

b Mars S. P., 5th wire, — 2.05 rev. = 3′ 16″.93. Recorded north limb. There is evidently an error in the R.A. of Bessel 341, not now explicable.

c The axis was lowered during the afternoon, leaving the east end high 0.72 div. and image of wire D, 0.11 rev. west.

d Bessel 341, north of Mars S. F., 0.86 rev. = 24″.00.

e The pulley being broken, the north roof door could not be opened.

f Bessel 341, south of Mars S. P., 5.23 rev. = 2′ 26″.00.

g The azimuth was changed before observations.

h Diameter of Mars, 0.50 rev. = 14″.00.

i Mars N. P., north of Bessel 341, 2.73½ rev. = 1′ 16″.45.

k H. C. 15707, 5th wire, + 2.09 = 5′ 12″.63.

l Mars N. P., 4th wire + 3.06 rev. = 1′ 25″.50.

m H. C. 15707, 5th wire, + 2.07½ rev. = 5′ 12″.13.

n Mars N. P., south of Bessel 341, 0.41½ rev. = 11″.65.

o H. C. 15707, 5th wire, + 2.00 rev. = 5′ 10″.13.

p Mars S. F., 4th wire, — 1.31 rev. = 36″.60.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A.R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Feb. 16	λ Cancri	8 12 9.91	+0.302	–25.82	8 11 44.39	302 5 54.45	–1 24.36	+4.9	. .	+24 28 59.12	M.
2		ι Argus	9 13 36.47	– .580	25.84	9 13 10.05	25 12 31.08	+ 25.10	. .	. .	–58 39 26.97	
3		α Hydræ	9 20 45.46	+ .073	25.85	9 20 19.68	334 35 9.93	– 25.37	. .	. .	– 8 1 15.35	
4	17	Bessel . . . 341	7 55 29.85	.640	26.40	7 55 4.09	301 34 35.70	1 26.46	6.9	. .	+25 0 17.97	P.
5 *a*		Mars . . . . N.P.	7 56 14.83	.641	26.40	7 55 49.07	301 32 59.30	1 26.55	. .	+6.1	25 1 48.36	
6		λ Cancri	8 12 10.21	+ .688	26.40	8 11 44.50	302 5 53.05	–1 24.74	. .	. .	+24 28 58.90	
7		ι Argus	9 13 37.39	– .920	26.43	9 13 10.04	25 12 29.33	+ 25.11	. .	. .	–58 39 27.23	
8		α Hydræ	9 20 45.83	+ .253	26.43	9 20 19.65	334 35 10.97	– 25.37	. .	. .	– 8 1 18.39	
9	18	Mars . . . . S.F.	7 55 24.85	.551	27.00	7 54 58.40	301 32 41.23	1 27.67	6.0	–6.0	+25 2 20.55	M.
10 *b*		Bessel . . . 341	7 55 30.36	.551	27.00	7 55 3.91	301 34 34.33	1 27.56	. .	. .	25 0 21.34	
11		λ Cancri	8 12 10.76	.597	27.01	8 11 44.35	302 5 52.77	1 25.92	. .	. .	24 29 1.26	
12		v^1 Cancri	8 18 18.20	+ .548	27.01	8 17 51.74	301 33 58.15	–1 27.71	. .	. .	+25 0 57.67	
13		ι Argus	9 13 37.90	– .874	27.02	9 13 10.00	25 12 28.70	+ 25.56	. .	. .	–58 39 26.15	
14		α Hydræ	9 20 46.49	+ .202	27.02	9 20 19.67	334 35 11.60	– 25.79	. .	. .	– 8 1 17.70	
15	19	Mars . . . . N.P.	7 54 36.15	.259	27.11	7 53 9.30	301 32 3.75	1 26.45	3.5	+6.0	+25 2 47.31	P.
16 *c*		Bessel . . . 341	7 55 30.80	.259	27.11	7 55 3.95	301 34 34.08	1 26.31	. .	. .	25 0 22.84	
17		λ Cancri	8 12 11.11	.309	27.12	8 11 44.30	302 5 55.38	1 24.58	. .	. .	24 28 59.81	
18 *d*		v^1 Cancri	8 18 18.61	.314	27.12	8 17 51.80	301 33 57.40	1 26.34	. .	. .	25 0 59.55	
19	20	Mars . . . . S.F.	7 53 52.59	.311	27.59	7 53 25.31	301 32 10.33	1 26.21	2.9	–5.9	25 2 52.99	M.
20 *e*		Bessel . . . 341	7 55 31.03	.255	27.59	7 55 3.70	301 34 38.16	1 26.07	. .	. .	25 0 19.12	
21		λ Cancri	8 12 11.46	.307	27.60	8 11 44.17	302 5 54.15	1 24.35	. .	. .	24 29 1.41	
22 *f*		v^1 Cancri	8 18 18.86	.311	27.60	8 17 51.57	301 34 59.28	1 26.05	. .	. .	24 59 57.98	
23	21	82 Geminorum . . .	7 40 10.13	.291	27.64	7 39 42.78	303 4 41.62	1 20.21	6.4	. .	23 30 6.30	P.
24		Mars . . . . N.P.	7 53 10.46	.302	27.64	7 52 43.12	301 31 54.95	1 25.25	. .	+5.9	25 2 52.11	
25 *g*		Bessel . . . 341	7 55 31.15	.246	27.64	7 55 3.76	301 34 37.45	1 25.10	. .	. .	25 0 15.36	
26		λ Cancri	8 12 11.60	.298	27.64	8 11 44.26	302 5 53.45	1 23.51	. .	. .	24 28 57.77	
27	22	82 Geminorum . . .	7 40 10.26	.290	27.93	7 39 42.62	303 4 44.55	1 20.97	2.7	. .	23 30 7.83	G.
28		Mars . . . . N.P.	7 52 32.47	.301	27.93	7 52 4.84	301 32 13.42	1 25.91	. .	5.8	25 2 38.10	
29 *h*		Bessel . . . 341	7 54 42.53	.301	27.93	7 54 14.90	301 35 7.42	1 25.74	. .	. .	24 59 49.73	
30		λ Cancri	8 12 11.60	.297	27.94	8 11 43.96	302 5 55.83	1 24.06	. .	. .	24 28 59.64	
31	23	82 Geminorum . . .	7 40 10.74	.288	28.22	7 39 42.81	303 4 45.50	1 21.55	4.6	. .	23 30 5.56	P.
32		Mars . . . . N.P.	7 51 58.59	.299	28.22	7 51 30.67	301 32 38.12	1 26.57	. .	+5.8	25 2 12.16	
33		Bessel . . . 341	7 55 31.70	.246	28.22	7 55 3.73	301 34 38.68	1 26.45	. .	. .	25 0 17.28	
34		λ Cancri	8 12 12.14	.295	28.23	8 11 44.21	302 5 55.52	1 24.86	. .	. .	24 28 58.85	
35	24	82 Geminorum . . .	7 40 11.16	.295	28.71	7 39 42.75	303 4 43.25	1 20.80	4.7	. .	23 30 6.96	M.
36		Mars . . . . S.F.	7 51 28.93	.306	28.71	7 51 0.53	301 33 26.80	1 25.65	. .	–5.7	25 1 33.96	
37		λ Cancri	8 12 12.64	.304	28.72	8 11 44.22	302 5 53.65	1 23.88	. .	. .	+24 28 59.64	
38	25	α Canis Maj. . . .	6 39 6.93	.020	28.99	6 38 37.96	343 4 58.50	16.08	4.5	. .	–16 31 12.81	P.
39		82 Geminorum . . .	7 40 11.44	.302	29.00	7 39 42.74	303 4 43.85	1 21.08	. .	. .	+23 30 6.84	
40		Bessel . . . 341	7 47 34.90	.314	29.00	7 47 6.21	301 31 54.00	1 26.04	. .	. .	25 3 1.65	
41		Mars . . . . N.P.	7 50 50.54	.313	29.00	7 50 21.85	301 33 57.43	1 25.91	. .	+5.7	25 0 52.39	
42		B. A. C. . . . 2703	7 58 18.87	.297	29.01	7 57 50.16	303 42 12.72	1 19.22	. .	. .	22 52 36.11	
43	26	82 Geminorum . . .	7 40 11.91	.278	29.40	7 39 42.79	303 4 43.42	1 20.17	+5.1	. .	23 30 5.76	M.
44		Bessel . . . 341	7 47 35.33	.291	29.40	7 47 6.22	301 31 52.20	1 25.07	. .	. .	25 3 1.88	
45 *i*		Mars . . . . S.F.	7 50 37.57	+0.290	–29.40	7 50 8.46	301 35 5.23	–1 24.90	. .	–5.6	+24 59 54.28	

a Mars N. P., 4th wire, + 3.45 rev. = 1′ 36″.40.
b Bessel 341, 4th wire, + 4.05 rev. = 1′ 53″.10.
c Bessel 341, 5th wire, — 3.72 rev. = 2′ 30″.33.
d v^1 Cancri. Double; observed south, preceding star.
e Bessel 341, 5th wire, — 3.81 rev. = 2′ 27″.83.
f Bessel 341, south of Mars 5.82 rev. = 2′ 42″.50.
g v^1 Cancri. Observed south, preceding star.
h This was mistaken for Bessel 341, south of Mars N. P., 6.23 rev. = 2′ 54″.00.
i Mars S. F., 5th wire, — 2.19 rev. = 3′ 13″.03.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Feb. 26	ι Argus	9 13 39.94	—0.633	—29.42	9 13 9.89	25 12 33.88	+ 24.65	+5.1	. .	—58 39 29.52	M.
2		α Hydræ	9 20 48.97	+ .047	29.42	9 20 19.60	334 35 12.05	— 24.88	. .	. .	— 8 1 18.16	
3	27	82 Geminorum . . .	7 40 11.90	.261	29.45	7 39 42.71	303 4 42.62	1 20.40	5.1	. .	+23 30 6.79	P.
4		Bessel . . . 341	7 47 35.34	.274	29.45	7 47 6.16	301 31 53.88	1 25.37	. .	. .	25 3 0.50	
5 a		Mars . . . . N.P.	7 50 15.84	.272	29.45	7 49 46.66	301 35 59.71	1 25.15	. .	+5.6	24 58 48.85	
6		B. A. C. . . . 2703	7 58 19.23	.255	29.45	7 57 50.03	303 42 11.75	1 18.60	. .	. .	22 52 35.86	
7	28	82 Geminorum . . .	7 40 12.39	.330	29.92	7 39 42.80	303 4 45.08	1 21.63	5.2	. .	23 30 5.46	M.
8		Bessel . . . 341	7 49 8.31	.288	29.92	7 48 38.68	301 40 46.68	1 26.14	. .	. .	24 54 8.37	
9		Mars . . . . S.F.	7 49 59.89	.289	29.92	7 49 30.26	301 37 30.67	1 26.32	. .	—5.5	24 57 30.06	
10		B. A. C. . . . 2703	7 58 19.88	+ .325	29.92	7 57 50.28	303 42 14.00	—1 19.69	. .	. .	+22 52 34.60	
11		ι Argus	9 13 40.69	— .726	29.94	9 13 10.02	25 12 33.48	+ 25.15	. .	. .	—58 39 29.72	
12		α Hydræ	9 20 49.54	+ .059	29.95	9 20 19.65	334 35 13.08	— 25.38	. .	. .	— 8 1 18.79	
13	29	82 Geminorum . . .	7 40 12.76	.112	30.28	7 39 42.59	303 4 47.78	1 22.32	4.3	. .	+23 30 4.35	G.
14		Bessel . . . 341	7 49 8.58	.119	30.28	7 48 38.42	301 40 46.43	1 26.88	. .	. .	24 54 10.26	
15 b		Mars . . . . N.P.	7 49 45.02	.064	30.28	7 49 14.81	301 38 34.90	1 27.00	. .	+5.5	24 56 16.41	
16	Mar. 1	Bessel . . . 341	7 49 8.90	.006	30.33	7 48 38.58	301 40 42.78	1 25.19	3.8	. .	24 54 12.72	G.
17 c		Mars . . . . S.F.	7 49 35.31	.006	30.33	7 49 4.99	301 40 28.58	1 25.20	. .	—5.4	24 54 32.33	
18		Bessel . . . 341	7 55 33.64	.061	30.34	7 55 3.36	301 34 35.58	1 25.64	. .	. .	25 0 20.37	
19	2	Bessel . . . 341	7 49 9.58	.166	30.83	7 48 38.92	301 40 43.70	1 24.17	5.2	. .	24 54 9.38	P.
20 d		Mars . . . . N.P.	7 49 27.46	.221	30.83	7 48 56.85	301 41 51.56	1 24.28	. .	+5.4	24 52 56.23	
21		Bessel . . . 341	7 55 34.44	+ .222	30.83	7 55 3.83	301 34 33.62	—1 24.68	. .	. .	+25 0 19.97	
22		ι Argus	9 13 41.33	— .619	30.86	9 13 9.85	25 12 37.60	+ 24.73	. .	. .	—58 39 32.92	
23		α Hydræ	9 20 50.49	+ .002	30.86	9 20 19.63	334 35 13.43	— 24.96	. .	. .	— 8 1 19.56	
24	3	Bessel . . . 341	7 49 10.09	.224	31.17	7 48 39.15	301 40 45.05	1 25.25	4.8	. .	+24 54 9.51	G.
25 e		Mars . . . . N.P.	7 49 23.31	.279	31.17	7 48 52.42	301 43 48.85	1 25.08	. .	5.3	24 51 0.24	
26*		Bessel . . . 341	7 54 46.11	.225	31.17	7 54 15.17	301 35 1.38	1 25.68	. .	. .	24 59 53.61	
27	4	Mars . . . . N.P.	7 49 22.40	.335	31.51	7 48 51.23	301 45 49.02	1 24.72	5.3	5.3	24 48 59.21	P.
28		Bessel . . . 341	7 55 35.14	+ .281	31.51	7 55 3.91	301 34 34.82	—1 25.34	. .	. .	+25 0 19.33	
29		ι Argus	9 13 42.23	— .808	31.53	9 13 9.89	25 12 36.12	+ 24.81	. .	. .	—58 39 32.12	
30		α Hydræ	9 20 51.20	+ .029	31.53	9 20 19.70	334 35 12.48	— 25.03	. .	. .	— 8 1 18.64	
31	6	H. C. 15401	7 47 8.94	.184	32.22	7 46 36.90	301 50 4.42	1 24.35	5.0	. .	+24 44 49.04	P.
32 f		Mars . . . . N.P.	7 49 29.97	.184	32.22	7 48 57.93	301 50 12.22	1 24.34	. .	+5.2	24 44 36.03	
33		Bessel . . . 341	7 55 35.52	.130	32.22	7 55 3.43	301 34 36.40	1 25.20	. .	. .	25 0 17.91	
34	7	Mars . . . . S.F.	7 49 38.91	.479	32.36	7 49 7.03	301 52 52.30	1 25.06	5.5	—5.2	24 42 6.57	G.
35		Bessel . . . 341	7 55 35.53	+ .427	32.36	7 55 3.60	301 34 34.95	—1 26.07	. .	. .	+25 0 19.73	
36		ι Argus	9 13 43.24	—1.160	32.37	9 13 9.71	25 12 34.33	+ 25.14	. .	. .	—58 39 30.86	
37		α Hydræ	9 20 51.87	+ .033	32.37	9 20 19.53	334 35 13.20	— 25.35	. .	. .	— 8 1 19.24	
38	8	H. C. 15412	7 47 29.71	.364	32.50	7 46 57.57	301 58 5.68	1 25.51	5.3	. .	+24 36 48.64	P.
39 g		Mars . . . . N.P.	7 49 49.61	.364	32.50	7 49 17.47	301 55 7.18	1 25.67	. .	+5.1	24 39 42.20	
40		Bessel . . . 341	7 55 36.00	+ .369	32.50	7 55 3.87	301 34 37.10	—1 26.81	. .	. .	+25 0 18.52	
41		ι Argus	9 13 43.37	—1.016	32.50	9 13 9.85	25 12 35.55	+ 25.33	. .	. .	—58 39 32.07	
42		α Hydræ	9 20 52.23	— .007	32.50	9 20 19.72	334 35 12.20	— 25.56	. .	. .	— 8 1 17.83	
43	9	H. C. 15412	7 47 29.74	+ .270	32.50	7 46 57.51	301 58 6.75	1 23.57	+4.1	. .	+24 36 46.83	G.
44 h		Mars . . . . S.F.	7 50 4.41	+0.270	—32.50	7 49 32.18	301 57 59.75	—1 23.57	. .	—5.1	+24 36 58.93	

a Mars N. P., 5th wire, — 0.30 rev. = 4′ 5″.83.
b Mars N. P., north of Bessel 341, 4.71 rev. = 2′ 11″.50.
c Mars S. F., north of Bessel 341, 0.51 rev. = 14″.20.
d Mars N. P., south of Bessel 341, 2.43 rev. = 1′ 7″.86.
e Mars N. P., south of Bessel 341, 6.58 rev. = 3′ 3″.80.
f Mars N. P., south of H. C. 15401, 0.28 rev. = 7″.80.
g Mars N. P., 4th wire, — 6.39 rev. = 2′ 58″.50.
h Mars S. F., north of H. C. 15412, 0.25 rev. = 7″.00.
* This confirms the third observation of February 22, and the Ephemeris is presumed to be in error — 35″.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 *a*	March 9	Greenwich . . 485	8 50 58.47	+0.241	—32.50	8 50 26.21	304 50 34.68	—1 15.26	+ 4.1	. .	+21 44 10.59	G.
2 *b*		Bessel . . . 275	8 58 49.24	.234	32.50	8 58 16.97	305 28 23.83	1 13.53	. .	. .	21 6 19.71	
3 *c*		Bessel . . . 275	9 5 0.69	+ .229	32.50	9 4 28.42	305 55 36.65	—1 12.32	. .	. .	+20 39 5.68	
4		ι Argus	9 13 43.16	— .911	32 50	9 13 9.75	25 12 38.38	+ 24.73	. .	. .	—58 39 33.10	
5		α Hydræ	9 20 52.18	+ .045	32.50	9 20 19.73	334 35 15.62	— 24.99	. .	. .	— 8 1 20.62	
6	10	H. C. 15412	7 47 29.81	.545	32.73	7 46 57.63	301 58 5.82	1 24.70	5.2	. .	+24 36 47.79	P.
7 *d*		Mars . . . . N.P.	7 50 20.56	.543	32.73	7 49 48.37	302 0 32.72	1 24.56	. .	+5.0	24 34 15.75	
8		Greenwich . . 485	8 50 58.47	.501	32.74	8 50 26.23	304 50 35.12	1 16.13	. .	. .	21 44 9.92	
9		Bessel . . . 275	8 58 49.39	.492	32.74	8 58 17.14	305 28 23.98	1 14.37	. .	. .	21 6 19.30	
10		Bessel . . . 275	9 4 59.77	.431	32.74	9 4 27.46	305 57 8.23	1 13.14	. .	. .	20 37 33.82	
11 *e*		Bessel . . . 275	9 5 0.81	+ .431	32.74	9 4 28.50	305 55 38.02	—1 13.15	. .	. .	+20 39 4.04	
12		ι Argus	9 13 43.66	—1.129	32.74	9 13 9.79	25 12 37.58	+ 25.03	. .	. .	—58 39 33.70	
13		α Hydræ	9 20 52.30	+ .090	32.74	9 20 19.65	334 35 14.50	— 25.26	. .	. .	— 8 1 20.33	
14	11	Mars . . . . S.F.	7 50 41.39	.077	32.89	7 50 8.58	302 3 39.88	1 24.63	4.5	—5.0	+24 34 19.36	M.
15	12	Mars . . . . N.P.	7 51 3.16	.403	32.97	7 50 30.59	302 6 25.75	1 23.84	4.4	+4.9	24 28 22.90	P.
16 *f*		Bessel . . . 339	7 51 32.52	.348	32.97	7 50 59.90	302 6 27.98	1 23.84	. .	. .	24 28 25.57	
17		Greenwich . . 485	8 50 58.81	.435	32.97	8 50 26.28	304 50 34.62	1 15.53	4.5	. .	21 44 10.52	
18		Bessel . . . 275	8 58 49.66	.358	32.97	8 58 17.05	305 28 21.75	1 13.79	. .	. .	21 6 21.65	
19		Bessel . . . 275	9 5 1.13	+ .353	32.98	9 4 28.50	305 55 35.08	—1 12.58	. .	. .	+20 39 7.11	
20		ι Argus	9 13 43.81	—1.051	32.98	9 13 9.79	25 12 38.38	+ 24.91	. .	. .	—58 39 33.68	
21		α Hydræ	9 20 52.66	+ .011	32.98	9 20 19 69	334 35 13.58	— 25.13	. .	. .	— 8 1 18.74	
22	13	H. C. 15401	7 47 9.81	.416	33.12	7 46 37.11	301 50 3.10	1 24.27	4.0	. .	+24 44 51.28	M.
23		Mars . . . . S.F.	7 51 29.45	.412	33.12	7 50 56.74	302 9 44.50	1 23.21	. .	—4.9	24 25 13.72	
24 *g*		Bessel . . . 339	7 51 32.56	.413	33.12	7 50 59.85	302 6 27.39	1 23.39	. .	. .	24 28 26.11	
25		Bessel . . . 341	7 59 57.30	.419	33.12	7 59 24.60	301 42 13.38	1 24.79	3.9	. .	24 52 41.62	
26		Bessel . . . 341	8 6 48.91	.472	33.12	8 6 16.26	301 47 54.78	1 24.48	. .	. .	24 46 59.91	
27		λ Cancri	8 12 16.74	.468	33.12	8 11 44.09	302 5 50.20	1 23.55	. .	. .	24 29 3.56	
28 *h*		Washington . . .	8 13 42.94	.413	33.12	8 13 10.23	302 5 28.40	1 23.58	. .	. .	24 29 25.39	
29		Bessel . . . 344	8 28 47.68	.459	33.12	8 28 15.02	302 49 15.52	1 21.18	. .	. .	23 45 35.87	
30		Bessel . . . 344	8 35 39.93	.449	33.12	8 35 7.26	303 20 19.52	1 19.83	. .	. .	23 14 30.52	
31		Bessel . . . 344	8 40 50.89	.388	33.12	8 40 18.16	303 50 7.68	1 18.38	. .	. .	22 44 40.91	
32 *i*		Bessel . . . 344	8 40 55.41	.387	33.12	8 40 22.68	303 52 44.09	1 18.26	. .	. .	22 42 4.38	
33		Bessel . . . 278	8 49 27.71	.431	33.12	8 48 55.02	304 39 50.20	1 16.06	. .	. .	21 54 56.07	
34		Bessel . . . 278	9 0 0.81	.425	33.13	8 59 28.11	305 5 24.80	1 14.92	. .	. .	21 29 20.25	
35		Rumker . . . 2799	9 8 13.59	.414	33.13	9 7 40.87	305 53 35.50	1 12.77	. .	. .	20 41 7.48	
36		B. A. C. . . . 3181	9 12 51.27	.348	33.13	9 12 18.49	306 51 53.20	1 10.28	. .	. .	19 42 47.29	
37	14	Mars . . . . N.P.	7 51 56.29	.394	32.65	7 51 24.03	302 12 48.12	1 23.17	3.5	+4.9	24 22 0.76	G.
38 *k*		H. C. 15608	7 53 11.06	.393	32.65	7 52 38.80	302 15 55.02	1 23.00	. .	. .	24 18 58.59	
39		Anon	9 3 53.08	+ .364	32.64	9 3 20.80	305 37 24.18	—1 13.61	. .	. .	+20 57 20.04	
40		ι Argus	9 13 43.59	—1.349	32.64	9 13 9.60	25 12 36.92	+ 24.88	. .	. .	—58 39 31.19	
41		α Hydræ	9 20 52.20	+ .038	32.64	9 20 19.52	334 35 14.20	— 25.12	. .	. .	— 8 1 18.47	
42	15	H. C. 15401	7 47 9.10	.198	32.72	7 46 36.58	301 50 5.32	1 25.31	+ 4.8	. .	+24 44 49.30	M.
43		Mars . . . . S.F.	7 52 27.77	.193	32.72	7 51 55.24	302 16 20.58	1 24.00	. .	—4.8	24 18 37.53	
44 *l*		H. C. 15608	7 53 11.04	.139	32.72	7 52 38.51	302 15 56.28	1 24.02	. .	. .	24 18 57.05	
45		Bessel . . . 341	7 59 56.75	.145	32.72	7 59 24.18	301 42 13.95	1 25.94	. .	. .	24 52 41.30	
46		λ Cancri	8 12 16.36	.140	32.72	8 11 43.78	302 5 50.75	1 24.59	. .	. .	24 29 3.15	
47 *m*		Washington . . .	8 13 42.46	.140	32.72	8 13 9.88	302 5 35.35	1 24.61	. .	. .	24 29 18.57	
48		Washington . . .	8 28 4.26	+0.190	—32.72	8 27 31.73	302 36 47.28	—1 22.97	. .	. .	+23 58 5.00	

a Greenwich 485, comparing star, January 8.
b Bessel 275, comparing star, January 2.
c Bessel 275, comparing star, December 28.
d Mars N. P., north of H. C. 15412, 5.35 rev. = 2′ 29″.41.
e Bessel 275, south of preceding star, 3.23 rev. = 1′ 30″.21.
f Bessel 339, south of Mars N. L., 0.08 rev. = 0′ 2″.23.
g Bessel 339, 3d wire, — 2.10 rev. = 3′ 17″.11.
h Washington, 4th wire, — 0.78 rev. = 0′ 21″.80.
i Bessel 344, 3d wire, — 3.56 rev. = 2′ 36″.41.
k H. C. 15608, south of Mars N. P., 6.69 rev. = 3′ 6″.90.
l H. C. 15608, north of Mars S. F., + 0.87 rev. = 0′ 24″.30.
m Washington, 4th wire, — 0.55 rev. = 0′ 15″.40.

No for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Mar. 15	Bessel . . . 344	8 35 39.44	+0.182	—32.72	8 35 6.90	302 20 21.22	—1 20.73	+ 4.8	. .	+23 14 28.82	M.
2		Bessel . . . 344	8 40 50.64	.177	32.72	8 40 18.10	303 50 8.42	1 19.23	. .	. .	22 44 40.12	
3		Bessel . . . 278	8 47 58.83	.171	32.72	8 47 26.28	304 19 33.50	1 17.82	. .	. .	22 15 13.62	
4		Bessel . . . 278	8 54 19.88	.164	32.72	8 53 47.32	305 0 40.48	1 15.90	. .	. .	21 34 4.73	
5		Bessel . . . 278	9 0 0.31	.164	32.72	8 59 27.75	305 5 27.35	1 15.70	. .	. .	21 29 17.66	
6		Rumker . . . 2800	9 8 15.56	.153	32.72	9 7 42.99	306 7 0.58	1 12.93	. .	. .	20 27 41.66	
7		B. A. C. . . . 3181	9 12 50.70	.092	32.72	9 12 18.07	306 51 53.55	1 11.01	. .	. .	19 42 46.77	
8	16	Bessel . . . 341	8 6 48.57	.438	32.41	8 6 16.60	301 47 54.58	1 25.34	6.2	. .	24 46 58.67	P.
9		Washington . . .	8 20 19.63	.375	32.41	8 19 47.60	302 25 15.22	1 23.32	. .	. .	24 9 36.01	
10		Washington . . .	8 28 4.33	.425	32.41	8 27 32.35	302 36 46.22	1 22.75	. .	. .	23 58 4.44	
11		Bessel . . . 344	8 40 54.90	.353	32.40	8 40 22.85	303 47 33.22	1 19.14	. .	. .	22 47 13.83	
12		Bessel . . . 278	8 47 58.83	.399	32.40	8 47 26.83	304 19 31.70	1 17.61	. .	. .	22 15 13.82	
13		Bessel . . . 278	8 54 20.07	.389	32.40	8 53 48.06	305 0 38.72	1 15.65	. .	. .	21 34 4.84	
14		Bessel . . . 277	9 3 52.46	.382	32.40	9 3 20.44	305 33 0.40	1 14.17	. .	. .	21 1 41.68	
15		Washington . . .	9 8 47.23	+ .316	32.40	9 8 15.15	306 19 9.88	—1 12.11	. .	. .	+20 15 30.14	
16		ι Argus	9 13 43.31	—1.236	32.40	9 13 9.67	25 12 37.85	+ 25.01	. .	. .	—58 39 34.95	
17		α Hydræ	9 20 52.10	— .018	32.40	9 20 19.52	334 35 13.60	— 25 24	. .	. .	— 8 1 20.45	
18	18	Bessel . . . 341	8 6 48.34	+ .374	32.53	8 6 16.18	301 47 55.98	—1 27.72	5.8	. .	+24 47 0.05	P.
19		Bessel . . . 344	8 16 40.94	.423	32.53	8 16 8.83	302 9 50.92	1 26.49	. .	. .	24 25 3.88	
20		H. C. 17513	8 46 0.63	.398	32.53	8 45 28.50	303 43 12.90	1 21.65	. .	. .	22 51 37.06	
21		Bessel . . . 278	8 52 45.82	.331	32.53	8 52 13.62	304 32 20.20	1 19.25	. .	. .	22 2 27.36	
22		Bessel . . . 275	8 58 49.23	.370	32.53	8 58 17.07	305 28 24.90	1 16.56	. .	. .	21 6 19.97	
23		Bessel . . . 275	9 5 0.46	+ .363	32.53	9 4 28.29	305 55 37.15	—1 15.30	. .	. .	+20 39 6.46	
24		ι Argus	9 13 43.39	—1.318	32.53	9 13 9.54	25 12 37.52	+ 25.78	. .	. .	—58 39 34.99	
25		α Hydræ	9 20 52.16	— .049	32.53	9 20 19.58	334 35 14.25	— 26.01	. .	. .	— 8 1 19.93	
26	19	H. C. 15608	7 53 10.83	+ .379	32.69	7 52 38.52	302 15 57.00	1 24.79	4.1	. .	+24 18 57.80	M.
27		Bessel . . . 341	8 6 48.59	.331	32.70	8 6 16.22	301 47 57.80	1 26.49	. .	. .	24 46 58.70	
28		Washington . . .	8 28 35.71	.370	32.70	8 28 3.38	303 0 37.92	1 22.73	. .	. .	23 34 14.82	
29		Bessel . . . 278	8 44 48.16	.302	32.70	8 44 15.76	304 1 17.38	1 19.87	. .	. .	22 33 32.50	
30		Bessel . . . 278	8 50 58.33	.345	32.70	8 50 25.98	304 50 36.30	1 17.46	. .	. .	21 44 11.17	
31		H. C. 18132	9 4 49.41	+ .338	32.71	9 4 17.04	305 17 57.92	—1 16.17	. .	. .	+21 16 48.26	
32		ι Argus	9 13 43.20	—1.157	32.71	9 13 9.33	25 12 42.10	+ 25.47	. .	. .	—58 39 37.56	
33	20	Washington . . .	8 28 35.89	+ .383	32.95	8 28 3.32	303 0 35.90	—1 21.72	3.9	. .	+23 34 16.03	P.
34		H. C. 17513	8 46 0.61	.425	32.96	8 45 28.08	303 43 14.40	1 19.56	. .	. .	22 51 35.37	
35		Bessel . . . 278	8 52 46.30	.358	32.96	8 52 13.70	304 32 20.00	1 17.12	. .	. .	22 2 27.33	
36		Bessel . . . 275	8 58 49.53	.398	32.96	8 58 16.97	305 28 23.38	1 14.50	. .	. .	21 6 21.33	
37		Bessel . . . 275	9 5 0.87	.390	32.96	9 4 28.30	305 55 36.88	1 13.27	. .	. .	20 39 6.60	
38		Bessel . . . 275	9 10 54.86	+ .327	32.96	9 10 22.23	306 32 20.00	—1 11.82	. .	. .	+20 2 22.03	
39		ι Argus	9 13 43.75	—1.370	32.96	9 13 9.42	25 12 40.65	+ 25.11	. .	. .	—58 39 35.55	
40		α Hydræ	9 20 52.47	+ .017	32.96	9 20 19.49	334 35 14.35	— 25.33	. .	. .	— 8 1 18.81	
41	22	Washington . . .	8 20 20.05	.341	33.22	8 19 47.17	302 25 11.38	1 23.08	5.5	. .	+24 9 40.31	P.
42		Washington . . .	8 28 36.03	.332	33.22	8 28 3.14	303 0 34.18	1 21.31	. .	. .	23 34 15.74	
43		Bessel . . . 278	8 47 59.31	.366	33.22	8 47 26.46	304 19 31.82	1 17.51	. .	. .	22 15 14.30	
44		H. C. 18132	9 4 49.80	+ .351	33.22	9 4 16.93	305 17 53.90	—1 14.76	. .	. .	+21 16 49.47	
45		ι Argus	9 13 43.84	—1.320	33.22	9 13 9.30	25 12 40.18	+ 24.98	. .	. .	—58 39 36.55	
46		α Hydræ	9 20 52.70	— .065	33.22	9 20 19.41	334 35 15.25	— 25.25	. .	. .	— 8 1 21.39	
47	23	Bessel . . . 339	7 51 32.68	+0.451	—33.41	7 50 59.72	302 6 26.60	—1 24.33	+ 5.1	. .	+24 28 26.74	M.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Mar. 23	Washington	8 21 28.44	+0.444	—33.41	8 20 55.47	302 29 17.42	—1 23.36	+ 5.1	. .	+24 5 34.95	M.
2		Washington	8 30 44.88	.433	33.41	8 30 11.90	303 10 28.52	1 21.28	. . .	. .	23 24 21.77	
3		Bessel . . . 278	8 44 48.48	.471	33.41	8 44 15.54	304 1 12.80	1 18.83	. . .	. .	24 33 35.04	
4		Bessel . . . 275	9 5 0.28	.386	33.41	9 4 27.26	305 57 5.05	1 13.43	. . .	. .	20 37 37.39	
5 a		Bessel . . . 275	9 5 1.21	+ .386	33.41	9 4 28.19	305 55 33.75	—1 13.50	. . .	. .	+20 39 8.76	
6		ι Argus	9 13 44.09	—1.493	33.41	9 13 9.19	25 12 40.08	+ 25.14	. . .	. .	—58 39 36.21	
7	25	Bessel . . . 341	7 55 48.73	+ .538	33.25	7 55 16.02	301 39 43.35	—1 25.43	5.0	. .	+24 55 11.19	M.
8		Washington	8 20 20.28	.532	33.25	8 19 47.56	302 25 11.82	1 23.15	. . .	. .	24 9 40.44	
9		Washington	8 30 44.64	.580	33.25	8 30 11.97	303 10 30.58	1 20.78	. . .	. .	23 24 19.31	
10		Bessel . . . 278	8 44 1.08	.517	33.25	8 43 28.35	304 1 16.70	1 18.39	. . .	. .	22 33 30.80	
11 b		Bessel . . . 278	8 44 48.44	.517	33.25	8 44 15.71	304 1 18.40	1 18.39	. . .	. .	22 33 29.10	
12 c		Bessel . . . 278	8 46 31.24	.515	33.25	8 45 58.51	304 12 7.12	1 17.86	. . .	. .	22 22 39.85	
13 a		Bessel . . . 275	9 5 0.14	.501	33.25	9 4 27.39	305 57 5.45	1 13.13	. . .	. .	20 37 36.79	
14 d		Bessel . . . 275	9 5 1.26	.501	33.25	9 4 28.51	305 55 35.25	1 13.19	. . .	. .	20 39 7.05	
15*	26	Washington	8 21 27.65	.609	33.26	8 20 55.00	302 29 26.00	1 22.40	4.9	. .	24 5 25.61	P.
16		Washington	8 32 13.96	.599	33.26	8 31 41.30	303 18 35.82	1 19.87	. . .	. .	23 16 13.26	
17		Bessel . . . 278	8 47 59.22	.643	33.26	8 47 26.60	304 19 32.98	1 16.83	. . .	. .	22 15 13.06	
18		Washington	9 8 47.93	+ .568	33.26	9 8 15.24	306 19 8.25	—1 11.39	. . .	. .	+20 15 32.35	
19		ι Argus	9 13 43.07	— .541	33.26	9 13 9.27	25 12 40.85	+ 24.80	. . .	. .	—58 39 36.44	
20		α Hydræ	9 20 52.38	+ .346	33.26	9 20 19.47	334 35 14.28	— 25.02	. . .	. .	— 8 1 20.05	
21	27	Washington	8 20 22.76	.673	33.38	8 19 50.05	302 15 1.05	1 23.66	13.1	. .	+24 19 43.62	M.
22		Washington	8 30 44.80	.663	33.38	8 30 12.08	303 10 21.88	1 20.77	. . .	. .	23 24 19.90	
23 e		Washington	8 32 13.70	.661	33.38	8 31 40.98	303 18 33.12	1 20.35	. . .	. .	23 16 8.24	
24		Bessel . . . 278	8 46 31.21	.651	33.38	8 45 58.48	304 11 56.25	1 17.77	. . .	. .	22 22 42.53	
25		Washington	9 8 47.67	.626	33.38	9 8 14.92	306 19 1.22	1 11.99	. . .	. .	20 15 31.78	
26	29	H. C. 16393	8 15 18.11	.674	33.21	8 14 45.57	302 34 25.00	1 22.38	8.9	. .	24 0 22.59	M.
27		Washington	8 20 22.36	.679	33.21	8 19 49.83	302 15 6.70	1 23.42	. . .	. .	24 19 41.93	
28		Washington	8 32 13.56	.720	33.21	8 31 41.07	303 18 33.62	1 20.16	. . .	. .	23 16 11.75	
29		Washington	9 8 47.67	.627	33.21	9 8 15.09	306 19 4.32	1 11.78	. . .	. .	20 15 32.67	
30	30	Bessel . . . 275	9 8 47.13	+ .664	32.97	9 8 14.82	306 42 26.05	—1 10.75	8.8	. .	+19 52 10.01	P.
31		ι Argus	9 13 42.79	— .621	32.97	9 13 9.20	25 12 38.72	+ 24.88	. . .	. .	—58 39 38.29	
32		α Hydræ	9 20 52.09	+ .335	32.97	9 20 19.46	334 35 10.45	— 25.11	. . .	. .	— 8 1 20.03	
33	31	H. C. 16464	8 17 8.57	.676	33.40	8 16 35.85	302 33 13.02	1 18.50	8.3	. .	+24 1 31.29	M.
34		Bessel . . . 275	9 8 47.44	.638	33.41	9 8 14.67	306 42 26.15	1 10.15	. . .	. .	19 52 9.81	
35	April 2	Bessel . . . 278	8 48 5.98	.934	33.84	8 47 33.07	304 25 59.75	1 18.23	7.7	. .	22 8 44.89	M.
36		Bessel . . . 275	9 7 59.09	.897	33.85	9 7 26.14	306 43 8.02	1 11.88	. . .	. .	19 51 30.27	
37	6	Washington	8 20 21.29	.532	35.15	8 19 46.67	302 25 6.00	1 23.28	8.2	. .	24 9 43.19	M.
38		Bessel . . . 278	8 48 7.30	.566	35.16	8 47 32.71	304 25 55.55	1 17.15	. . .	. .	+22 8 47.71	
39		α Hydræ	9 20 54.07	.314	35.17	9 20 19.21	334 35 10.50	25.22	. . .	. .	— 8 1 19.37	
40	8	Washington	8 20 24.91	.522	35.68	8 19 49.75	302 15 5.90	1 23.37	+ 8.0	. .	+24 19 43.58	M.
41		α Hydræ	9 20 54.66	+0.297	—35.69	9 20 19.27	334 35 11.20	— 25.13	. . .	. .	— 8 1 19.96	

a Bessel 275, 4th wire, — 3.27 rev. = 1′ 31″.30.

a As there are two stars in the field differing in A. R. almost accurately 1*s*., it is supposed that the A. R. of the preceding was observed while the declination of the following one was measured. I have transposed the circle readings to make the results conform with the observations on pages 316 and 317.

J. M. G.

b Bessel 278, 4th wire, + 0.14 rev. = 1″.70.

c Bessel 278, 6th wire, + 5.13 rev. = 10′ 48″.72.

d Bessel 275, 4th wire, — 3.23 rev. = 1′ 30″.20.

e Washington, 6th wire, — 0.51 rev. = 8′ 11″.24.

* Mr. Phelps observed this star on only one wire. It is reduced on the supposition that it was B.

INFERIOR CONJUNCTION OF VENUS, 1850-51.

MERIDIAN CIRCLE OBSERVATIONS.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed. apparent declination.	Observer.
	1850.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Oct. 19	α Scorpii . . .	16 20 31.90	+0.109	−18.025	16 20 13.98	352 39 21.05	−0 6.72	− 2.92	. .	−26 5 37.30	G.
2		α Tri. Aust. . .	16 33 8.44	.682	18.007	16 32 51.11	35 17 44.40	+ 36.88	. .	. .	68 44 44.25	
3		Venus . . N.L.	16 39 49.14	.113	17.997	16 39 31.25	353 3 53.68	− 6.34	. .	+ 14.4	26 30 24.71	
4	20	α Scorpii . . .	16 20 29.99	.129	16.164	16 20 13.96	352 39 22.90	− 6.72	5.18	. .	26 5 36.89	G.
5		α Tri. Aust. . .	16 33 6.47	.721	16.146	16 32 51.04	35 17 45.60	+ 36.92	. .	. .	68 44 43.23	
6		Venus . . N.L.	16 43 37.01	.131	16.131	16 43 21.01	353 13 25.30	− 6.20	. .	14.6	26 39 54.41	
7	21	α Scorpii . . .	16 20 28.07	.096	14.241	16 20 13.93	352 39 23.90	− 6.72	6.47	. .	26 5 36.60	G.
8		α Tri. Aust. . .	16 33 4.44	.721	14.224	16 32 50.94	35 17 45.62	+ 36.89	. .	. .	68 44 41.93	
9		Venus . . N.L.	16 47 22.63	.132	14.204	16 47 8.56	353 22 23.55	− 6.06	. .	14.8	26 48 51.71	
10*a*	22	α Tri. Aust. . .	16 33 2.93	.615	11.931	16 32 51.62	35 17 45.87	+ 37.26	6.57	. .	68 44 42.45	G.
11		Venus . . N.L.	16 51 6.10	.080	11.906	16 50 54.27	353 30 46.85	− 5.99	. .	14.9	26 57 15.08	
12	23	α Scorpii . . .	16 20 23.97	.177	10.130	16 20 14.02	352 39 24.12	− 6.75	6.52	. .	26 5 36.74	G.
13		α Tri. Aust. . .	16 33 0.97	.190	10.114	16 32 51.05	35 17 45.92	+ 37.07	. .	. .	68 44 42.36	
14		Venus . . N.L.	16 54 46.58	+ .176	10.085	16 54 36.67	353 38 39.00	− 5.83	. .	15.1	27 5 7.64	
15	24	α Scorpii . . .	16 20 22.07	− .067	8.098	16 20 13.90	352 39 19.95	− 6.78	2.75	. .	26 5 36.31	G.
16		α Tri. Aust. . .	16 32 59.86	.815	8.081	16 32 50.96	35 17 41.75	+ 37.22	. .	. .	68 44 42.11	
17		Venus . . N.L.	16 58 23.14	.068	8.045	16 58 15.02	353 45 54.17	− 5.75	. .	15.3	27 12 26.86	
18*b*	25	α Scorpii . . .	16 20 20.08	.080	6.129	16 20 13.87	352 39 19.30	− 6.71	3.08	. .	26 5 35.40	G.
19		α Tri. Aust. . .	16 32 57.77	.931	6.110	16 32 50.73	35 17 42.92	+ 36.81	. .	. .	68 44 42.54	
20		Venus . . N.L.	17 1 59.64	.093	6.066	17 1 53.48	353 52 36.75	− 5.58	. .	15.6	27 19 9.58	
21	26	α Scorpii . . .	16 20 17.76	.058	3.805	16 20 13.89	352 39 20.25	− 6.69	2.45	. .	26 5 37.00	G.
22		α Tri. Aust. . .	16 32 55.61	.886	3.784	16 32 50.94	35 17 42.82	+ 36.75	. .	. .	68 44 43.01	
23		Venus . . N.L.	17 5 31.36	.072	3.730	17 .5 27.56	353 58 48.42	− 5.48	. .	15.9	27 25 22.28	
24	27	α Scorpii . . .	16 20 15.41	.101	1.483	16 20 13.83	352 39 22.65	− 6.79	4.60	. .	26 5 37.15	G.
25		α Tri. Aust. . .	16 32 53.64	1.416	1.462	16 32 50.76	35 17 41.72	+ 37.30	. .	. .	68 44 40.31	
26		Venus . . N.L.	17 8 59.47	.123	− 1.402	17 8 57.95	354 4 28.22	− 5.47	. .	16.2	27 31 0.24	
27	28	α Scorpii . . .	16 20 13.04	.135	+ 0.945	16 20 13.86	352 39 21.65	− 6.83	4.42	. .	26 5 36.29	G.
28		α Tri. Aust. . .	16 32 51.20	1.416	0.966	16 32 50.75	35 17 41.60	+ 37.47	. .	. .	68 44 40.54	
29		Venus . . N.L.	17 12 24.09	.124	1.033	17 12 24.89	354 9 35.68	− 5.42	. .	16.4	27 36 8.13	
30 *c*	30	α Scorpii . . .	16 20 8.11	.079	5.807	16 20 13.84	352 39 21.57	− 6.79	− 4.60	. .	26 5 36.07	G.
31		α Tri. Aust. . .	16 32 46.37	1.371	5.830	16 32 50.83	35 17 41.35	+ 37.27	. .	. .	68 44 39.91	
32		Venus . . N.L.	17 19 2.66	−0.003	+ 5.956	17 19 8.62	354 18 8.00	−0 5.26	. .	+ 16.8	−27 44 40.83	

a Passing cirri prevented α Scorpii being seen.

b The screw moving the wires in collimation was turned last night to reduce the error.

c α Scorpii extremely unsteady.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declinatian.	Observer.
	1850.		h. m. s.	s.	s.	h. m. s.	° ′ ″	″	″	″	° ″ ″	
1	Oct. 31	α Scorpii . . .	16 20 5.39	−0.090	+ 8.659	16 20 13.96	352 39 22.60	− 6.67	− 5.32	. .	−26 5 36.50	G.
2		α Tri. Aust. . .	16 32 43.56	1.393	8.686	16 32 50.86	35 17 43.42	+ 36.61	. .	. .	68 44 40.60	
3a		Venus . . N.L.	17 22 15.60	.116	8.787	17 22 24.27	354 21 40.90	− 5.11	. .	+ 17.1	27 48 13.46	
4	Nov. 1	α Scorpii . . .	16 20 2.43	.130	11.738	16 20 14.04	352 39 22.45	− 6.69	4.35	. .	26 5 37.30	G.
5		α Tri. Aust. . .	16 32 40.91	1.755	11.665	16 32 50.82	35 17 45.20	+ 36.71	. .	. .	68 44 43.45	
6		η Ophiuchi . . .	17 1 36.00	+ .047	11.726	17 1 47.78	342 5 53.63	− 16.76	. .	. .	15 31 58.41	
7		Venus . . N.L.	17 25 23.94	− .163	11.776	17 25 35.56	354 24 41.15	5.08	. .	17.3	27 51 14.91	
8b	2	α Scorpii . . .	16 19 59.31	.160	14.698	16 20 13.85	352 39 25.68	− 6.69	8.89	. .	26 5 35.99	G.
9		α Tri. Aust. . .	16 32 38.23	2.230	14.725	16 32 50.73	35 17 46.18	+ 36.74	. .	. .	68 44 39.92	
10		β Aræ	17 12 38.05	1.162	14.810	17 12 51.70	. . . .	. .	. .	. .	. . . .	
11		Venus . . N.L.	17 28 27.67	.170	14.843	17 28 42.34	354 27 8.48	− 5.03	. .	+ 17.6	27 53 38.05	
12	4	α Tri. Aust. . .	16 32 32.21	2.246	20.847	16 32 50.81	35 17 45.50	+ 36.71	8.38	. .	68 44 39.72	P.
13		η Ophiuchi . . .	17 1 26.68	.045	20.906	17 1 47.54	342 5 57.28	− 16.86	. .	. .	15 31 57.93	
14		β Aræ	17 12 32.07	1.174	20.929	17 12 51.83	21 56 12.68	+ 21.02	. .	. .	55 22 51.21	
15		α Aræ	17 19 56.44	.961	20.944	17 20 16.42	. . . .	. .	. .	. .	. . . .	
16c		Venus . . S.L.	17 34 21.11	.272	20.973	17 34 41.81	354 31 10.75	− 5.01	. .	− 18.2	27 51 5.05	
17	5	α Scorpii . . .	16 19 50.21	.193	23.680	16 20 13.70	352 39 21.23	− 6.69	7.75	. .	26 5 32.68	G.
18		α Tri. Aust. . .	16 32 28.73	−1.860	23.704	16 32 50.57	35 17 43.03	+ 36.72	. .	. .	68 44 37.89	
19		η Ophiuchi . . .	17 1 23.25	+ .025	23.760	17 1 47.04	342 5 53.55	− 16.77	. .	. .	15 31 54.92	
20		Venus . . N.L.	17 37 9.84	− .195	23.828	17 37 33.47	354 31 23.40	4.97	. .	+ 18.5	27 57 55.07	
21	7	α Scorpii . . .	16 19 44.96	.076	28.919	16 20 13.80	352 39 22.23	− 6.70	5.68	. .	26 5 35.74	G.
22		α Tri. Aust. . .	16 32 23.33	−1.692	28.941	16 32 50.58	35 17 41.95	+ 36.79	. .	. .	68 44 38.95	
23		η Ophiuchi . . .	17 1 18.46	+ .099	28.991	17 1 47.55	342 5 52.68	− 16.79	. .	. .	15 31 56.10	
24		Venus . . N.L.	17 42 31.89	− .110	+29.062	17 43 0.84	354 31 44.93	4.98	. .	19.0	27 58 19.16	
25	*8	α Scorpii . . .	16 20 44.10	.065	−30.047	16 20 13.99	352 39 22.53	− 6.72	6.05	. .	26 5 35.65	G.
26		α Tri. Aust. . .	16 33 22.46	−1.669	30.052	16 32 50.74	35 17 40.88	+ 36.92	. .	. .	68 44 37.64	
27		η Ophiuchi . . .	17 2 17.71	+ .109	30.065	17 1 47.75	342 5 57.28	− 16.85	. .	. .	15 32 0.27	
28		Venus . . N.L.	17 46 5.69	− .099	30.084	17 45 35.51	354 31 11.68	5.00	. .	19.3	27 57 45.82	
29d	10	α Scorpii . . .	16 20 45.16	.120	31.452	16 20 13.59	352 39 24.65	− 6.78	7.73	. .	26 5 36.03	G.
30		α Tri. Aust. . .	16 33 24.09	−1.564	31.456	16 32 51.07	35 17 40.15	+ 37.25	. .	. .	68 44 35.56	
31		η Ophiuchi . . .	17 2 18.94	+ .036	31.466	17 1 47.51	342 5 55.18	− 17.01	. .	. .	15 31 56.33	
32		Venus . . N.L.	17 50 56.94	− .150	31.482	17 50 25.31	354 28 36.78	5.09	. .	20.0	27 55 9.85	
33		μ′ Sagittarii . .	18 5 20.29	− .076	31.487	18 4 46.73	347 39 22.70	11.52	. .	. .	21 5 29.34	
34e	11	η Ophiuchi . . .	17 2 19.29	+ .063	31.945	17 1 47.40	342 5 54.95	− 16.87	7.48	. .	15 31 56.49	G.
35		α Aræ	17 20 48.86	− .643	31.936	17 20 16.28	16 18 26.08	+ 15.28	. .	. .	−49 44 59.77	
36		α Ophiuchi . . .	17 28 30.26	+ .492	31.933	17 27 58.82	313 54 1.88	− 54.22	. .	. .	+12 40 33.93	
37		Venus . . N.L.	17 53 12.21	− .140	31.922	17 52 40.15	354 26 37.23	5.08	. .	20.3	−27 53 10.86	
38f	13	α Scorpii . . .	16 20 44.54	.066	30.687	16 20 13.79	352 39 25.73	− 6.75	10.05	. .	26 5 34.82	G.
39		α Tri. Aust. . .	16 33 23.67	2.958	30.680	16 32 50.03	35 17 41.60	+ 37.10	. .	. .	68 44 34.54	
40		α Aræ	17 20 48.02	1.019	30.652	16 20 16.35	16 18 26.95	+ 15.34	. .	. .	49 44 58.13	
41		Venus . . N.L.	17 57 18.57	.087	30.632	17 56 47.85	354 21 9.33	− 5.18	. .	+ 21.0	27 47 40.99	
42	14	α Scorpii . . .	16 20 43.83	.114	29.736	16 20 13.98	352 39 26.20	− 6.53	−11.88	. .	26 5 33.68	G.
43		α Tri. Aust. . .	16 33 22.41	−2.148	29.726	16 32 50.54	35 17 45.58	+ 35.88	. .	. .	68 44 35.47	
44		η Ophiuchi . . .	17 2 17.01	+0.105	−29.705	17 1 47.41	342 5 57.38	− 16.38	. .	. .	−15 31 55.01	

a This is the best observation yet made of the planet.

b Light cirri over all the heavens.

c Recorded N.L., but the discordance with ephemeris induces me to believe the S.L. was really observed, and it is reduced accordingly. J. M. G.

d α Scorpii was exceedingly unsteady. α Aræ was seen but too dimly to measure; it certainly is not so bright as β. α Ophiuchi obscured by clouds, through which Venus also was seen. Wires D, F, G of μ^1 Sagittarii occulted by horizontal wire.

e α Scorpii and α Trianguli Australis not seen by reason of clouds.

f The observations of α Scorpii and α Trianguli Australis are not reliable in declination, both objects being rather like flaring mops than stars, and very unsteady.

* At 2h. 20m. shortened clock pendulum and advanced hand one minute.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1850.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Nov. 14	α Aræ	17 20 46.84	−0.805	−29.691	17 20 16.35	16 18 27.53	−0 14.83	−11.88	. .	−49 44 56.37	G.
2		Venus . . N.L.	17 59 10.03	.151	29.664	17 58 40.22	354 17 47.20	5.06	. .	+21.4	27 44 17.55	
3 *a*	15	α Scorpii . . .	16 20 42.73	.192	28.587	16 20 13.95	352 39 27.63	− 6.67	10.85	. .	26 5 36.00	G.
4		α Tri. Aust. . .	16 33 21.60	−2.306	28.578	16 32 50.72	35 17 44.58	+ 36.37	. .	. .	68 44 35.99	
5		η Ophiuchi . . .	17 2 16.06	+ .036	28.559	17 1 47.54	342 5 58.35	− 16.61	. .	. .	15 31 56.78	
6		α Aræ	17 21 46.07	− .908	28.546	17 21 16.62	16 18 29.53	+ 15.04	. .	. .	49 44 59.61	
7		Venus . . N.L.	18 0 53.30	.229	28.519	18 0 24.55	354 13 58.10	− 5.19	. .	21.7	27 40 29.65	
8	16	α Scorpii . . .	16 20 41.59	.162	27.721	16 20 13.71	352 39 25.95	− 6.59	10.73	. .	26 5 34.52	G.
9		α Tri. Aust. . .	16 33 20.80	−2.790	27.712	16 32 50.30	35 17 44.58	+ 36.19	. .	. .	68 44 35.93	
10		η Ophiuchi . . .	17 2 14.96	+ .118	27.691	17 1 47.39	342 5 58.63	− 16.52	. .	. .	15 31 57.27	
11		α Aræ	17 21 44.87	−1.049	27.678	17 21 16.14	16 18 28.15	+ 14.96	. .	. .	49 44 58.27	
12		Venus . . N.L.	18 2 28.07	.205	27.649	18 2 0.22	354 9 35.90	− 5.23	. .	22.1	27 36 7.93	
13 *b*	17	α Scorpii . . .	16 20 40.66	.239	26.554	16 20 13.87	352 39 28.95	− 6.78	13.58	. .	26 5 33.48	G.
14		α Tri. Aust. . .	16 33 20.27	−2.948	26.543	16 32 50.78	35 17 45.10	+ 37.18	. .	. .	68 44 34.59	
15		η Ophiuchi . . .	17 2 13.68	+ .049	26.517	17 1 47.21	342 6 0.35	− 17.05	. .	. .	15 31 55.61	
16		α Aræ	17 21 44.01	−1.153	26.500	17 21 16.36	16 18 28.55	+ 15.44	. .	. .	49 44 56.30	
17		Venus . . N.L.	18 3 54.03	− .281	26.462	18 3 27.29	354 4 48.30	− 5.48	. .	22.4	27 31 17.53	
18 *c*	18	α Scorpii . . .	16 20 38.79	+ .203	25.167	16 20 13.82	352 39 28.98	− 6.63	15.18	. .	26 5 33.06	G.
19		α Tri. Aust. . .	16 33 17.79	−2.053	25.154	16 32 50.58	35 17 45.83	+ 36.23	. .	. .	68 44 32.77	
20		η Ophiuchi . . .	17 2 12.16	+ .444	25.126	17 1 47.47	342 6 0.63	− 16.54	. .	. .	15 31 54.80	
21		α Aræ	17 21 41.98	− .606	25.107	17 21 16.27	16 18 29.88	+ 14.98	. .	. .	49 44 55.57	
22		Venus . . N.L.	18 5 10.31	+ .169	25.064	18 4 45.42	353 59 31.23	− 5.39	. .	22.8	27 25 59.35	
23 *d*	19	α Scorpii . . .	16 20 37.46	+ .197	23.708	16 20 13.95	352 39 29.35	− 6.55	14.10	. .	26 5 34.59	G.
24		α Tri. Aust. . .	16 33 16.87	−2.643	23.695	16 32 50.53	35 17 46.85	+ 35.93	. .	. .	−68 44 34.57	
25		α Ophiuchi . . .	17 28 21.11	+1.230	23.639	17 27 58.70	313 54 6.80	− 52.71	. .	. .	+12 40 34.12	
26		Venus . . N.L.	18 6 17.90	.158	23.601	18 5 54.46	353 53 52.43	5.43	. .	23.2	−27 20 21.99	
27 *e*	20	α Scorpii . . .	16 20 35.20	+ .117	21.059	16 20 14.26	352 39 32.55	− 6.69	16.45	. .	26 5 35.30	G.
28		α Tri. Aust. . .	16 33 15.16	−3.093	21.048	16 32 51.02	35 17 49.58	+ 36.73	. .	. .	68 44 35.75	
29		β Aræ	17 13 14.35	−1.371	21.014	17 12 51.97	21 56 15.60	+ 20.90	. .	. .	55 22 45.94	
30		Venus . . N.L.	18 7 14.73	+ .112	20 968	18 6 53.87	353 47 44.15	− 5.65	. .	23.6	27 14 11.54	
31	21	α Scorpii . . .	16 20 34.01	+ .210	20.020	16 20 14.20	352 39 29.78	− 6.66	13.45	. .	26 5 35.56	G.
32		α Tri. Aust. . .	16 33 13.79	−3.097	20.009	16 32 50.68	35 17 46.15	+ 36.53	. .	. .	68 44 35.12	
33		η Ophiuchi . . .	17 2 7.01	+ .595	19.984	17 1 47.63	342 6 2.80	− 16.68	. .	. .	15 31 57.56	
34		α Aræ	17 21 37.39	− .925	19.968	17 21 16.50	16 18 29.53	+ 15.10	. .	. .	49 44 57.07	
35		Venus . . N.L.	18 8 3.17	+ .207	19.928	18 7 43.45	353 41 5.13	− 5.72	. .	+24.0	−27 7 35.85	
36 *f*	23	β Ophiuchi . .	17 36 21.38	1.027	17.822	17 36 4.59	321 56 13.98	40.84	14.15	. .	+ 4 38 15.12	M.
37		Venus . . S.L.	18 9 10.01	.162	17.792	18 8 52.38	353 27 17.13	5.99	. .	−24.7	−26 52 58.18	
38		α Lyræ	18 32 7.07	+2.162	17.772	18 31 51.46	287 57 18.40	−2 39.22	. .	. .	+38 39 9.08	
39	26	α Tri. Aust. . .	16 33 6.84	−2.174	14.030	16 32 50.64	35 17 42.22	+ 36.25	−14.73	. .	−68 44 29.63	G.
40		η Ophiuchi . . .	17 2 1.03	+ .497	14.011	17 1 47.52	342 6 1.10	− 16.55	. .	. .	15 31 55.71	
41		β Aræ	17 13 6.43	− .885	14.004	17 12 51.54	21 56 13.43	+ 20.63	. .	. .	−55 22 45.22	
42		α Ophiuchi . . .	17 28 11.66	+1.127	13.994	17 27 58.80	313 54 7.28	− 53.18	. .	. .	+12 40 34.74	
43		Venus . . N.L.	18 9 31.70	.231	13.967	18 9 17.96	353 1 0.80	6.28	. .	+26.0	−26 27 31.68	
44		α Lyræ	18 32 3.69	+1.880	−13.952	18 31 51.62	287 57 16.45	−2 36.35	. .	. .	+38 39 8.74	

a Venus was seen through cirri, and the contact with the horizontal wire is doubtful.

b After the observations, let down the east end of the axis.

c The star being faint, the observation of α Aræ is not very good.

d Constantly passing cirri, and declinations uncertain. Heavy earthquakes at La Serena both before and after the observations of the Venus stars.

e Cirri all the time. Declination of α Scorpii on last wire. Transits of α Scorpii and α Trianguli Australis observed at only one wire. Microscopes B, C, and D were moved before observations.

f Objects very unsteady.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1850.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 *a*	Nov. 27	α Tri. Aust. . .	16 33 5.76	−2.303	−12.796	16 32 50.66	35 17 44.15	+0 36.85	−13.90	. .	−68 44 32.99	G.
2		η Ophiuchi . . .	17 2 0.01	+ .335	12.774	17 1 47.58	342 6 2.73	— 16.82	. .	. .	15 31 57.90	
3		β Aræ	17 13 5 44	−1.031	12.765	17 12 51.64	21 56 14.35	+ 20.97	. .	. .	−55 22 47.31	
4		α Ophiuchi . . .	17 28 10.60	+ .955	12.754	17 27 58.81	313 54 9.38	— 54.05	. .	. .	+12 40 32.68	
5		Venus . . N.L.	18 9 17.80	.074	12.722	18 9 5.15	352 51 33.05	6.52	. .	+26.4	−26 18 4.92	
6		α Lyræ	18 32 2.21	+1.700	12.705	18 31 51.20	287 57 20.38	−2 38.92	. .	. .	+38 39 6.55	
7 *b*	28	β Aræ	17 13 4.43	−1.198	11.824	17 12 51.41	21 56 9.80	+ 21.07	11.48	. .	−55 22 45.28	G.
8		α Ophiuchi . . .	17 28 9.45	+1.091	11.810	17 27 58.73	313 54 7.65	— 54.30	. .	. .	+12 40 32.24	
9		Venus . . N.L.	18 8 52.67	.102	11.779	18 8 40.99	352 41 38.45	6.72	. .	26.8	−26 8 12.94	
10		α Lyræ	18 32 1.16	+2.200	11.764	18 31 51.59	287 57 18.68	−2 39.65	. .	. .	+38 39 6.56	
11 *c*	30	α Tri. Aust. . .	16 33 3.51	−2.340	10.924	16 32 50.25	35 17 47.50	+ 37.05	17.85	. .	−68 44 32.59	G.
12		η Ophiuchi . . .	17 1 58.21	+ .312	10.913	17 1 47.61	342 6 6.10	— 16.91	. .	. .	15 31 57.23	
13		Venus . . N.L.	18 6 32.55	.039	10.889	18 6 21.70	352 20 24.73	7.04	. .	27.6	−25 46 53.33	
14		α Lyræ	18 32 0.70	+1.647	10.879	18 31 51.47	287 57 28.58	2 39.67	. .	. .	+38 39 3.05	
15	Dec. 2	α Tri. Aust. . .	16 33 2.55	−2.372	9.702	16 32 50.48	. . . .	. . .	17.53	. .	. . . . .	G.
16		Venus . . N.L.	18 5 28.57	+ .068	9.659	18 5 18.98	351 57 6.48	7.36	. .	28.4	−25 23 35.88	
17		α Lyræ	18 31 59.47	+1.643	9.646	18 31 51.47	287 57 27.18	−2 38.74	. .	. .	+38 39 3.20	
18 *d*	4	α Tri. Aust. . .	16 33 1.21	−2.251	8.436	16 32 50.52	35 17 47.10	+ 36.93	18.15	. .	−68 44 31.77	G.
19		β Aræ	17 13 0.88	— .953	8.418	17 12 51.51	21 56 16.88	+ 21.02	. .	. .	55 22 45.64	
20		Venus . . N.L.	18 2 43.73	+ .136	8.397	18 2 35.47	351 31 51.50	— 7.77	. .	29.1	−24 58 20.57	
21		α Lyræ	18 31 57.96	+1.664	8.384	18 31 51.24	287 57 27.60	−2 39.26	. .	. .	+38 39 4.92	
22 *e*	5	α Tri. Aust. . .	16 33 0.73	−2.123	7.815	16 32 50.79	35 17 45.98	+ 36.74	18.18	. .	−68 44 30.43	G.
23		β Aræ	17 13 0.43	— .920	7.797	17 12 51.71	21 56 16.78	+ 20.91	. .	. .	−55 22 45.40	
24		β Ophiuchi . . .	17 36 11.47	+ .791	7.787	17 36 4.47	321 56 24.35	— 40.63	. .	. .	+ 4 38 9.57	
25		Venus . . N.L.	18 1 6.86	.164	7.777	18 0 59.25	351 18 28.25	7.94	. .	29.4	−24 44 57.42	
26		α Lyræ	18 31 57.51	1.672	7.763	18 31 51.42	287 57 28.15	2 38.44	. .	. .	+38 39 2.58	
27 *f*	8	α Scorpii . . .	16 20 22.47	+ .161	8.569	16 20 14.06	352 39 24.18	— 6.67	8.78	. .	−26 5 34.62	G.
28		α Tri. Aust. . .	16 33 0.57	−1.132	8.573	16 32 50.86	35 17 36.13	+ 36.60	. .	. .	68 44 29.84	
29		α Aræ	17 20 25.51	— .283	8.589	17 20 16.64	16 18 24.03	+ 15.13	. .	. .	49 44 56.27	
30		Venus . . N.L	17 55 26.04	+ .190	8.601	17 55 17.63	350 35 20.88	— 8.57	. .	30.2	−24 1 59.62	
31		α Lyræ	18 31 58.89	+1.103	8.613	18 31 51.38	287 57 18.68	−2 37.84	. .	. .	+38 39 2.05	
32	10	α Tri. Aust. . .	16 33 1.94	−1.334	9.664	16 32 50.94	35 17 36.40	+ 36.48	8.02	. .	−68 44 30.75	M.
33		Venus . . N L.	17 51 2.04	+ .099	9.682	17 50 52.46	350 4 36.78	9.02	. .	30.6	−23 31 16.23	
34		α Lyræ	18 31 59.73	1.068	9.691	18 31 51.11	287 57 17.20	2 37.27	. .	. .	+38 39 2.20	
35	12	Venus . . N.L.	17 46 15.06	.130	10.003	17 46 5.19	349 32 30.13	9.44	9.83	+31.0	−22 58 7.79	M.
36		α Lyræ	18 31 59.64	1.759	10.003	18 31 51.40	287 57 17.43	2 36.03	. .	. .	+38 39 1.06	
37 *g*	13	Venus . . S.L.	17 43 45.58	.137	10.559	17 43 35.16	349 17 2.25	9.59	8.70	−31.1	−22 42 38.75	M.
38		α Lyræ	18 31 59.59	1.759	10.495	18 31 50.85	287 57 16.25	+2 34.55	. .	. .	+38 39 1.11	
39	20	α Scorpii . . .	16 20 20.95	+ .214	6.736	16 20 14.43	352 39 30.63	— 6.74	−13.20	. .	−26 5 35.98	G.
40		α Tri. Aust. . .	16 33 0.81	−2.771	6.731	16 32 51.31	35 17 38.68	+ 37.05	. .	. .	68 44 28.42	
41		η Ophiuchi . . .	17 1 53.90	+ .577	6.722	17 1 47.75	342 6 3.95	— 16.91	. .	. .	15 32 0.73	
42		β Aræ	17 12 59.68	−1.170	6.718	17 12 51.79	21 56 6.18	+ 21.08	. .	. .	55 22 39.95	
43		Venus . . N.L.	17 21 28.82	+ .437	— 6.715	17 21 22.54	346 48 36.73	— 12.27	. .	+30.8	−20 15 7.95	

a α Aræ certainly is not so bright as β, and yesterday was not distinguishable. α Lyræ extremely tremulous.

b The stars were very much blurred and quite unsteady. α Aræ not discernible.

c Constant cumuli. Declination of Venus very doubtful.

d Passing cumuli during observations.

e Declination of β Ophiuchi doubtful. α Aræ not distinguishable.

f α Aræ rather brighter than β.

g The crescent of Venus very slender; and cusps badly defined.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1850.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 *a*	Dec. 22	α Scorpii . . .	16 20 20.38	+0.247	−6.302	16 20 14.33	352 39 31.15	- · 6.68	−13.55	. .	−26 5 36.81	G.
2		α Tri. Aust. . .	16 33 0.53	−2.771	6.301	16 32 51.46	35 17 38.10	+ 36.71	. .	. .	68 44 27.15	
3		η Ophiuchi . . .	17 1 53.34	+ .577	6.298	17 1 47.62	312 6 4.50	− 16.76	. .	. .	15 32 0.08	
4		β Aræ	17 13 59.40	−1.170	6.297	17 13 51.93	21 56 8.70	+ 20.89	. .	. .	55 22 41.93	
5		Venus . . N.L.	. . . .	. .	. .	. . . .	346 33 27.22	− 12.40	. .	+30.4	19 59 57.56	
6	29	α Tri. Aust. . .	16 32 59.77	−3.268	4.656	16 32 51.86	35 17 26.23	+ 36.84	3.10	. .	68 44 25.86	G.
7		η Ophiuchi . . .	17 1 52.50	+ .123	4.655	17 1 47.97	342 5 53.90	− 16.82	. .	. .	15 31 59.87	
8		Venus . . S L.	17 8 9.51	.040	4.655	17 8 4.90	345 5 20.53	13.87	. .	−28.2	18 31 1.25	
9	31	Venus . . S.L.	17 6 24.05	+ .038	4.460	17 6 19.63	344 47 8.75	14 20	3.95	27.4	18 12 49.09	G.
	1851.											
10 *b*	Jan. 5	α Scorpii . . .	16 20 18.60	− .204	3.674	16 20 14.72	352 39 24.95	− 6.79	6.40	. .	26 5 37.65	G.
11		α Tri. Aust. . .	16 32 59.97	−4.238	3.671	16 32 52.06	35 17 27.60	+ 37.29	. .	. .	68 44 24.38	
12		Venus . . S L.	17 4 56.64	+ .124	3.651	17 4 53.11	344 15 47.15	− 14.85	. .	25.4	17 41 26.39	
13		β Aræ	17 12 58.15	−2.056	3.646	17 12 52.45	21 55 59.00	+ 22.38	. .	. .	−55 22 40.87	
14		α Ophiuchi . . .	17 28 1.49	+1.157	3.636	17 27 59.01	313 54 12.43	− 54.69	. .	. .	+12 40 22.77	
15	6	α Scorpii . . .	16 20 18.00	− .264	2.863	16 20 14.87	352 39 29 38	− 6.66	8.48	. .	−26 5 40.13	G.
16		α Tri. Aust. . .	16 32 59.54	−4.359	2.856	16 32 52.32	35 17 31.05	+ 36.57	. .	. .	68 44 25.03	
17		Venus . . S.L.	17 5 8.48	+ .070	2.837	17 5 5.71	344 11 53.85	− 14.63	. .	25.0	17 37 31.63	
18		α Aræ	17 20 21.55	−1.531	2.829	17 20 17.19	16 18 17.35	+ 15.12	. .	. .	−49 44 49.88	
19		α Ophiuchi . . .	17 28 0.99	+1.175	2.824	17 27 59.34	313 54 13.55	− 53.63	. .	. .	+12 40 22.67	
20 *c*	7	α Scorpii . . .	16 20 17.66	− .240	2.429	16 20 14.99	352 39 27.90	− 6.72	7.50	. .	−26 5 39.57	G.
21		α Tri. Aust. . .	16 32 59.43	−4.568	2.425	16 32 52.44	35 17 31.18	+ 36.89	. .	. .	68 44 26.46	
22		Venus . . S.L.	17 5 29.94	+ .117	2.415	17 5 27.64	344 8 42.45	− 14.81	. .	24.6	17 34 21.43	
23		α Aræ	17 20 21.29	−1.585	2.411	17 20 17.29	16 18 17.33	+ 15.25	. .	. .	−49 44 50.97	
24		α Ophiuchi . . .	17 28 0.59	+1.223	2.408	17 27 59.40	313 54 12.85	− 54.11	. .	. .	+12 40 22.87	
25 *d*	8	α Scorpii . . .	16 20 17.20	− .163	2.062	16 20 14.98	352 39 25.08	− 6.69	7.68	. .	−26 5 36.60	G.
26 *e*		α Tri. Aust. . .	16 32 58.80	−4.257	2.058	16 32 52.49	. . . .	. .	. .	. .	. . . .	
27		Venus . . S.L.	17 6 0.84	+ .188	2.046	17 5 58.98	344 6 13.50	− 14.78	. .	24.2	17 31 52.73	
28		β Aræ	17 12 56.68	−2.113	2.044	17 12 52.52	21 56 1.70	+ 20.90	. .	. .	55 22 40.81	
29		α Aræ	17 20 20.74	1.481	2.041	17 20 17.22	16 18 17.35	+ 15.19	. .	. .	49 44 50.75	
30	9	α Scorpii . . .	16 20 16.56	.277	1.373	16 20 14.91	352 39 24.73	− 6.66	8.20	. .	26 5 35.76	G.
31		α Tri. Aust. . .	16 32 58.23	4.336	1.369	16 32 52.53	35 17 29.13	+ 36.55	. .	. .	68 44 23.37	
32		Venus . . S.L.	17 6 40.82	.007	1.357	17 6 39.46	344 4 26.88	− 14.74	. .	23.9	−17 30 5.93	
33 *f*		α Aræ	17 20 20.19	−1.660	1.353	17 20 17.18	. . . .	. .	. .	. .	. . . .	
34		α Ophiuchi . . .	17 27 59.70	+1.010	1.350	17 27 59.36	313 54 14.45	53.62	. .	. .	+12 40 21.48	
35 *g*	10	α Scorpii . . .	16 20 16.36	− .277	1.128	16 20 14.96	352 39 26.18	− 6.65	7.63	. .	−26 5 37.79	G.
36		α Tri. Aust. . .	16 32 57.58	−4.055	1.124	16 32 52.40	35 17 27.48	+ 36.49	. .	. .	68 44 22.23	
37		Venus . . S.L.	17 7 29.97	+ .049	1.115	17 7 28.90	344 3 16.28	− 14.74	. .	23.4	17 28 56.40	
38		α Aræ	17 20 19.91	−1.491	1.112	17 20 17.31	16 18 15.28	+ 15.09	. .	. .	−49 44 48.63	
39		α Ophiuchi . . .	17 27 59.29	+1.049	1.109	17 27 59.23	313 54 13.50	− 53.52	. .	. .	+12 40 21.76	
40	11	α Scorpii . . .	16 20 16.43	− .228	1.280	16 20 14.92	352 39 29.95	− 6.69	−10.50	. .	−26 5 38.65	G.
41		α Tri. Aust. . .	16 32 58.05	−4.253	1.282	16 32 52.52	35 17 31.83	+ 36.74	. .	. .	68 44 23.96	
42		Venus . . S.L.	17 8 28.34	+ .119	1.285	17 8 27.17	344 2 47.85	− 14.84	. .	−23.1	17 28 25.30	
43		α Aræ	17 20 20.20	−1.610	1.286	17 20 17.30	16 18 20.75	+ 15.19	. .	. .	−49 44 51.33	
44		α Ophiuchi . . .	17 27 59.41	+1.183	−1.288	17 27 59.31	313 54 19.08	− 53.88	. .	. .	+12 40 19.41	

a Declination observed at wire F.
b α Scorpii very unsteady. Declination of α Ophiuchi uncertain. α Aræ not to be seen.
c Measured diameter of Venus doubtful.
d Declination of α Aræ uncertain.
e Seen by flashes only.
f Too faint to measure declination.
g α Aræ brighter than β. The instrument was lifted from the Ys and pivots and micrometers cleaned.

DECEMBER 23.—It being found that the female screw to the micrometer moving the horizontal system of wires was worn out, the eye-piece was removed, and the system of wires being accidentally broken, a new one was inserted; the instrument was ready for use again on the 27th, but that and the following days were cloudy.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1851.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Jan. 12	α Scorpii . . .	16 20 16.31	—0.140	— 1.416	16 20 14.75	352 39 30.78	— 6.61	—13.75	. .	—26 5 36.31	G.
2		η Ophiuchi . .	17 1 49.61	+ .236	1.429	17 1 48.43	342 6 8.15	16.58	. .	. .	15 32 3.71	
3		Venus . . S.L.	17 9 35.25	.159	1.421	17 9 33.99	344 2 49.08	14.68	. .	—22 7	—17 28 23.84	
4		α Ophiuchi . .	17 27 59.40	+1.267	1.422	17 27 59.25	313 54 19.75	53 28	. .	. .	+12 40 21.39	
5 a	13	α Scorpii . . .	16 20 16.03	— .254	.586	16 20 15.19	352 39 32.08	— 6.67	13.05	. .	—26 5 38.25	G.
6		α Tri. Aust. . .	16 32 58.10	—4.698	.578	16 32 52.82	35 17 34.63	+ 36.61	. .	. .	68 44 24.08	
7		η Ophiuchi . .	17 1 49.01	+ .210	.560	17 1 48.66	342 6 6.43	— 16.71	. .	. .	15 32 2.56	
8		Venus . . S.L.	17 10 49.61	.128	.555	17 10 49.18	344 3 23.48	14.78	. .	22.3	—17 28 59.21	
9		α Ophiuchi . .	17 27 58.76	1.302	— .544	17 27 59.52	313 54 16.85	53.70	. .	. .	+12 40 21.01	
10 b	14	β^1 Scorpii . . .	15 56 44.94	+ .062	+ .328	15 56 45.33	345 57 28.10	12.88	15.40	. .	—19 23 25.71	G.
11		α Scorpii . . .	16 20 14.70	— .010	.336	16 20 15.03	352 39 33.25	— 6.63	. .	. .	26 5 37.11	
12		α Tri. Aust. . .	16 32 53.35	— .992	.344	16 32 52.70	35 17 35.88	+ 36.42	. .	. .	68 44 23.79	
13		η Ophiuchi . . .	17 1 47.96	+ .101	.360	17 1 48.42	342 6 8.58	— 16.62	. .	. .	15 32 2.45	
14		Venus . . S.L.	17 12 11.83	.081	.366	17 12 12.28	344 4 29.88	14.69	. .	21.9	—17 30 3.78	
15		α Ophiuchi . .	17 27 58.40	.339	.375	17 27 59.11	313 54 25.50	53.42	. .	. .	+12 40 17.43	
16 c	15	β^1 Scorpii . . .	15 56 44.07	.476	.937	15 56 45.48	345 57 28.73	12.85	12.88	. .	—19 23 28.89	G.
17		α Scorpii . . .	16 20 13.94	+ .424	.946	16 20 15.31	352 39 32.38	— 6.98	. .	. .	26 5 38.41	
18		α Tri. Aust. . .	16 32 51.95	— .090	.951	16 32 52.99	35 17 35.13	+ 36.36	. .	. .	68 44 24.50	
19		η Ophiuchi . .	17 1 47.03	+ .506	.963	17 1 48.50	342 6 6.48	— 16.60	. .	. .	15 32 2.89	
20		Venus . . S.L.	17 13 41.88	.491	.968	17 13 43.34	344 5 58.88	14.64	. .	21.5	—17 31 35.75	
21		α Ophiuchi . .	17 27 57.77	.761	.973	17 27 59.50	313 54 20.63	53.33	. .	. .	+12 40 19.69	
22 d	16	β^1 Scorpii . . .	15 56 43.56	.510	1.396	15 56 45.47	345 57 28.85	12.86	14.38	. .	—19 23 27.50	G.
23		α Scorpii . . .	16 20 13.34	+ .424	1.404	16 20 15.17	352 39 34.20	— 6.62	. .	. .	26 5 39.09	
24		α Tri. Aust. . .	16 32 52.04	— .587	1.408	16 32 52.86	35 17 34.78	+ 36.39	. .	. .	68 44 22.68	
25		η Ophiuchi . .	17 1 46.57	+ .559	1.418	17 1 48.55	342 6 8.68	— 16.61	. .	. .	15 32 3.58	
26		Venus . . S.L.	17 15 19.86	.533	1.422	17 15 21.82	344 7 58.73	— 14.63	. .	21.2	17 33 34.41	
27		α Aræ	17 20 15.98	.049	1.424	17 20 17.45	16 18 23.05	+ 15.04	. .	. .	—49 44 49.60	
28		α Ophiuchi . .	17 27 57.17	.938	1.426	17 27 59.53	313 54 21.30	— 53.36	. .	. .	+12 40 20.55	
29	17	β^1 Scorpii . . .	15 56 43.50	.175	1.841	15 56 45.52	345 57 27.83	13.04	13.43	. .	—19 23 27.25	G.
30		α Scorpii . . .	16 20 13.39	+ .007	1.852	16 20 15.25	352 39 33.65	— 6.71	. .	. .	26 5 39.40	
31		α Tri. Aust. . .	16 32 52.80	—1.593	1.858	16 32 53.07	35 17 31.93	+ 36.88	. .	. .	68 44 24.27	
32		η Ophiuchi . .	17 1 46.57	+ .173	1.872	17 1 48.61	342 6 8.58	— 16.84	. .	. .	15 32 4.20	
33		Venus . . S.L.	17 17 5.71	.142	1.879	17 17 7.73	344 10 19.18	14.78	. .	20.9	—17 35 55.96	
34		α Ophiuchi . .	17 27 56.96	.571	1.885	17 27 59.42	313 54 22.23	54.09	. .	. .	+12 40 19.40	
35	20	β^1 Scorpii . . .	15 56 43.47	.039	2.102	15 56 45.61	345 57 26.65	13.04	11.33	. .	—19 23 28.17	G.
36		α Scorpii . . .	16 20 13.08	+ .018	2.098	16 20 15.20	352 39 31.73	— 6.72	. .	. .	26 5 39.57	
37		α Tri. Aust. . .	16 32 51.27	— .256	2.095	16 32 53.11	35 17 32.53	+ 36.88	. .	. .	68 44 23.97	
38		β Aræ	17 12 51.24	— .110	2.088	17 12 53.22	21 56 3.85	+ 20.90	. .	. .	55 22 39.31	
39		Venus . . S.L.	17 23 5.46	+ .043	2.087	17 23 7.59	344 19 18.48	— 14.63	. .	— 19 8	—17 44 58.61	
40		α Ophiuchi . .	17 27 57.09	.126	2.086	17 27 59.30	313 54 20.25	54.10	. .	. .	+12 40 19.49	
41	21	β^1 Scorpii . . .	15 56 43.45	+ .085	1.848	15 56 45.38	345 57 28.85	12.79	—12.40	. .	—19 23 29.55	G.
42		α Scorpii . . .	16 20 13.43	— .042	1.844	16 20 15.23	352 39 31.73	— 6.59	. .	. .	26 5 38.63	
43		α Tri. Aust. . .	16 32 52.40	—1.035	1.841	16 32 53.20	35 17 33.78	+ 36.18	. .	. .	68 44 23.45	
44		η Ophiuchi . .	17 1 46.54	+ .062	+ 1.836	17 1 48.44	342 6 6.45	— 16.52	.	. .	—15 32 3.42	

a The instrument was lifted and the azimuth and level screws changed after the observations.

b I do not understand why, since the 9th, α Trianguli Australis has not been seen until after it had passed the first wire.

c The circle was so that α Trianguli Australis must pass within 5″ of the horizontal wire, but it could not be discerned until between C and D.

d The collimating screw was moved.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for		Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
				Inst.	Clock.							
	1851.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	Jan. 21	α Aræ	17 20 15.88	−0.375	+ 1.833	17 20 17.34	16 18 23.43	+ 14.96	−12.40	. .	−49 44 51.88	G.
2		Venus . . S.L.	17 25 18.97	+ .041	1.832	17 25 20.84	344 22 54.43	− 14.30	. .	−19.5	17 48 34.12	
3	22	β¹ Scorpii . . .	15 56 43.50	+ .054	2.123	15 56 45.68	345 57 28.20	− 12.83	13.50	. .	19 23 27.76	G.
4		α Scorpii . . .	16 20 13.27	− .040	2.125	16 20 15.35	352 39 34.00	− 6.61	. .	. .	26 5 39.78	
5		α Tri. Aust. . .	16 32 52.59	−1.422	2.126	16 32 53.29	35 17 32.38	+ 36.30	. .	. .	68 44 21.07	
6		η Ophiuchi . .	17 1 46.43	+ .103	2.130	17 1 48.66	342 6 8.10	− 16.57	. .	. .	15 32 2.92	
7 a		α Aræ	17 20 15.99	− .415	2.132	17 20 17.71	16 18 23.33	+ 15.01	. .	. .	49 44 50.73	
8		Venus . . S.L.	17 27 37.94	+ .073	2.133	17 27 40.15	344 26 43.40	− 14.28	. .	19.2	17 52 22.31	
9	23	α Scorpii . . .	16 20 13.16	− .041	2.296	16 20 15.41	352 39 34.58	− 6.59	15.98	. .	26 5 37.90	G.
10		α Tri. Aust. . .	16 32 52.77	−1.775	2.300	16 32 53.30	35 17 33.70	+ 36.22	. .	. .	68 44 19.83	
11		η Ophiuchi . .	17 1 46.27	+ .138	2.306	17 1 48.71	342 6 10.10	− 16.52	. .	. .	15 32 3.49	
12 b		Venus . . S.L.	17 30 3.21	+ .099	2.312	17 30 5.62	344 30 41.08	14.18	. .	18.9	17 56 17.91	
13	24	α Scorpii . . .	16 20 12.77	− .107	2.707	16 20 15.37	352 39 34.50	− 6.65	14.65	. .	26 5 39.09	G.
14		α Tri. Aust. . .	16 32 52.59	−1.910	2.710	16 32 53.39	35 17 34.20	+ 36.55	. .	. .	68 44 20.19	
15		η Ophiuchi . .	17 1 45.86	+ .078	2.718	17 1 48.66	342 6 7.30	− 16.68	. .	. .	15 32 1.86	
16		α Aræ	17 20 15.67	− .709	2.722	17 20 17.68	16 18 21.98	+ 15.11	. .	. .	−49 44 48.33	
17		α Ophiuchi . .	17 27 56.33	− .525	2.724	17 27 59.53	313 54 25.15	− 53.62	. .	. .	+12 40 17.23	
18		Venus . . S.L.	17 32 34.08	+ .036	2.726	17 32 36.84	344 34 47.43	14.25	. .	18.6	−18 0 25.82	
19	25	α Scorpii . . .	16 20 12.54	− .140	3.006	16 20 15.41	352 39 35.03	− 6.69	15.33	. .	26 5 38.90	G.
20		α Tri. Aust. . .	16 32 52.50	−1.978	3.009	16 32 53.53	35 17 32.98	+ 36.78	. .	. .	68 44 20.32	
21		η Ophiuchi . .	17 1 45.56	+ .049	3.015	17 1 48.62	342 6 10.73	− 16.79	. .	. .	15 32 4.50	
22		α Aræ	17 20 15.47	− .753	3.019	17 20 17.74	16 18 20.45	+ 15.21	. .	. .	−49 44 46.22	
23		α Ophiuchi . .	17 27 55.97	+ .504	3.020	17 27 59.49	313 54 24.80	− 53.95	. .	. .	+12 40 18.59	
24		Venus . . S.L.	17 35 10.61	+ .009	3.022	17 35 13.73	344 39 0.50	14.27	. .	18.3	−18 4 56.79	
25	26	α Scorpii . . .	16 20 12.39	− .107	3.213	16 20 15.50	352 39 32.90	− 6.71	12.15	. .	26 5 38.93	G.
26		α Tri. Aust. . .	16 32 52.34	−1.910	3.213	16 32 53.64	35 17 30.45	+ 36.87	. .	. .	68 44 21.06	
27		β Aræ	17 12 51.16	.841	3.217	17 12 53.54						
28		α Aræ	17 20 15.17	− .622	3.217	17 20 17.76	16 18 19.40	+ 15.24	. .	. .	−49 44 48.38	
29		α Ophiuchi . .	17 27 55.94	+ .582	3.218	17 27 59.74	313 54 22.38	− 54.08	. .	. .	+12 40 17.96	
30 c		Venus . . S.L.	17 37 52.71	+ .034	3.219	17 37 55.96	344 43 18.70	14.24	. .	18.0	−18 9 0.20	
31	27	α Scorpii . . .	16 20 12.37	− .019	3.210	16 20 15.56	352 39 37.60	− 6.74	15.43	. .	26 5 41.32	G.
32		α Tri. Aust. . .	16 32 52.23	−1.730	3.210	16 32 53.71	35 17 34.18	+ 37.03	. .	. .	68 44 21.67	
33		η Ophiuchi . .	17 1 45.33	+ .158	3.211	17 1 48.70	342 6 10.40	− 16.92	. .	. .	15 32 3.94	
34		β Aræ	17 12 51.03	− .810	3.211	17 12 53.43	21 56 6.03	+ 21.08	. .	. .	55 22 37.57	
35		α Aræ	17 20 15.30	− .590	3.212	17 20 17.92						
36 d		Venus . . S.L.	17 40 39.96	+ .115	3.213	17 40 43.29	344 47 42.73	− 14.22	. .	17.7	18 13 21.27	
37	28	α Scorpii . . .	16 20 12.19	− .047	3.293	16 20 15.44	352 39 35.95	− 6.73	14.43	. .	26 5 40.68	G.
38		α Tri. Aust. . .	16 32 52.59	−2.222	3.293	16 32 53.66	35 17 34.30	+ 36.97	. .	. .	68 44 22.73	
39		η Ophiuchi . .	17 1 45.27	+ .177	3.295	17 1 48.74	342 6 10.75	− 16.87	. .	. .	15 32 5.34	
40		β Aræ	17 12 51.11	−1.070	3.295	17 12 53.33	21 56 5.88	+ 21.04	. .	. .	55 22 38.38	
41		α Aræ	17 20 15.22	− .685	3.295	17 20 17.83	16 18 23.38	+ 15.27	. .	. .	49 44 50.11	
41 e		Venus . . S.L.	17 43 32.26	+ .121	3.297	17 43 35.68	344 52 6.05	− 14.13	. .	−17.5	18 17 45.88	
43 f	Feb. 3	α Scorpii . . .	16 20 13.67	− .049	2.060	16 20 15.68	352 39 31.40	− 6.74	−10.70	. .	26 5 39.85	G.
44		α Tri. Aust. . .	16 32 53.90	−1.834	2.057	16 32 54.12	35 17 30.68	+ 37.02	. .	. .	68 44 22.89	
45		η Ophiuchi . . .	17 1 46.74	+0.135	+ 2.052	17 1 48.93	342 6 6.85	− 16.90	. .	. .	−15 32 5.14	

a Declination of α Aræ is not considered good.

b Declination of Venus observed through cirri, and deemed uncertain.

c The planet very unsteady.

d The planet extremely unsteady.

e The planet and stars were very unsteady. A workman being engaged breaking out stone on the eastern side of "Santa Lucia," every blow of his iron maul disturbed the mercury, making measures for the nadir very difficult.

f Declination of Venus observed through cirri.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for		Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
				Inst.	Clock.							
	1851.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ″ ″	
1	Feb. 3	β Aræ	17 12 52.48	—0.775	+2.049	17 12 53.75	21 56 3.25	+ 21.07	—10.70	. .	—55 22 39.51	G.
2		α Ophiuchi . . .	17 27 57.21	+ .578	2.048	17 27 59.84	313 54 24.58	— 51.30	. .	. .	+12 40 14.53	
3		Venus . . S L.	18 2 22.88	+ .082	2.040	18 2 25.00	345 17 20.78	13.74	. .	—15.9	—18 43 6.33	
4	5	α Scorpii . . .	16 20 14.11	— .141	1.785	16 20 15.75	352 39 22.28	— 6.74	+0.38	. .	26 5 41.81	G.
5		α Tri. Aust. . .	16 32 54.69	—2.113	1.783	16 32 54.36	35 17 19.48	+ 36.99	. .	. .	68 44 22.74	
6		η Ophiuchi . . .	17 1 47.17	+ .062	1.778	17 1 49.01	342 5 56.33	— 16.89	. .	. .	15 32 5.71	
7		β Aræ	17 12 53.10	—1.052	1.776	17 12 53.82	21 55 52.55	+ 21.05	. .	. .	55 22 39.87	
8		α Aræ	17 20 17.14	— .800	1.775	17 20 18.11	16 18 9.50	+ 15.29	. .	. .	49 44 51.06	
9		Venus . . S.L.	18 9 12.13	+ .001	1.768	18 9 13.90	345 24 35.50	— 13.61	. .	15.6	18 50 32.56	
10 a	6	α Scorpii . . .	16 20 14.24	— .173	1.718	16 20 15.78	352 39 22.60	— 6.67	—1.48	. .	26 5 40.34	G.
11		α Tri. Aust. . .	16 32 54.77	—2.180	1.718	16 32 54.31	35 17 20.90	+ 36.63	. .	. .	68 44 22.94	
12		η Ophiuchi . . .	17 1 47.18	+ .032	1.717	17 1 48.93	342 5 58.63	— 16.73	. .	. .	15 32 6.31	
13		β Aræ	17 12 53.10	—1.101	1.717	17 12 53.71	21 55 53.05	+ 20.85	. .	. .	55 22 38.31	
14		α Aræ . . .	17 20 17.27	— .844	1.717	17 20 18.14	16 18 9.28	+ 15.15	. .	. .	—49 44 48.84	
15		α Ophiuchi . . .	17 27 57.69	+ .528	1.716	17 27 59.93	313 54 15.25	— 53.74	. .	. .	+12 40 14.08	
16		Venus . . S.L.	18 12 41.88	— .030	1.716	18 12 43.57	345 28 1.45	13.42	. .	15.4	—18 53 57.04	
17 b	7	α Scorpii . . .	16 20 14.31	.167	1.806	16 20 15.95	352 39 24.08	— 6.70	2.35	. .	—26 5 40.92	G.
18		α Tri. Aust. . .	16 32 55.10	—2.402	1.806	16 32 54.50	35 17 22.68	+ 36.77	. .	. .	68 44 22.99	
19		η Ophuichi . . .	17 1 47.33	+ .062	1.806	17 1 49.20	342 6 0.08	— 16.40	. .	. .	15 32 7.22	
20		β Aræ . . .	17 12 53.31	—1.200	1.806	17 12 53.92	21 55 53.68	+ 20.92	. .	. .	55 22 38.14	
21		α Aræ	17 20 17.51	.913	1.806	17 20 18.40	16 18 9.40	+ 15.20	. .	. .	49 44 48.14	
22		Venus . . S.L.	18 16 15.28	.010	1.806	18 16 16.99	345 31 17.00	— 13.42	. .	15.2	18 57 11.92	
23 c	10	α Scorpii . . .	16 20 14.86	.182	1.448	16 20 16.13	352 39 23.60	— 6.75	—1.68	. .	26 5 41.06	G.
24		α Tri. Aust. . .	16 32 55.86	—2.431	1.446	16 32 54.88	35 17 19.88	+ 37.07	. .	. .	68 44 21.16	
25		η Ophiuchi . . .	17 1 47.87	+ .049	1.442	17 1 49.36	342 5 59.25	— 16.93	. .	. .	15 32 6.53	
26		β Aræ	17 12 54.10	—1.221	1.440	17 12 54.32	21 55 53.20	+ 21.10	. .	. .	55 22 38.51	
27		α Aræ	17 20 18.01	.932	1.439	17 20 18.52	16 18 9.15	+ 15.33	. .	. .	49 44 48.69	
28		Venus . . S.L.	18 27 14.34	— .025	1.438	18 27 15.75	345 39 24.78	— 13.40	. .	—14.5	—19 5 21.09	
29		α Lyræ	18 31 49.80	+1.244	+1.430	18 31 52.47	287 57 34.95	—2 39.81	. .	. .	+38 38 40.65	

a β Aræ is full a half magnitude brighter than α.

b α Aræ is certainly not so bright as β. After the observations the instrument was lifted, and the pivots cleaned with black lead.

c β Aræ is unquestionably a half magnitude brighter than α.

INFERIOR CONJUNCTION OF VENUS, 1852.

MERIDIAN CIRCLE OBSERVATIONS.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for		Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
				Inst.	Clock.							
	1852.		h. m. s.	s.	m. s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 *a*	May 30	ε Canis Maj. . . .	6 53 29.66	+0.185	—0 42.475	6 52 47.37	355 19 51.7	—0 4.28	+21.2	. .	—28 46 34.51	G.
2		α^2 Geminorum . . .	7 25 50.71	— .625	42.474	7 25 7.61	294 22 37.7	1 54.66	. .	. .	+32 12 29.87	
3		β Geminorum . . .	7 36 57.09	.496	42.473	7 36 14.12	298 12 2.3	1 37.06	. .	. .	28 22 47.67	
4		Venus . . . S.L.	7 43 23.10	— .511	42.473	7 42 40.12	302 27 35.1	1 21.93	. .	—14.6	+24 7 14.34	
5		15 Argus	8 1 56.01	+ .114	42.471	8 1 13.65	350 26 24.9	8.83	. .	. .	—23 53 3.16	
6 *b*	31	α Canis Min. . . .	7 32 14.36	— .138	41.833	7 31 32.39	320 58 1.4	43.51	19.4	. .	+ 5 35 56.82	G.
7		β Geminorum . . .	7 36 56.20	.375	41.833	7 36 13.99	298 12 7.3	1 39.69	. .	. .	28 22 47.10	
8		Venus . . . S.L.	7 46 37.14	— .398	41.833	7 45 54.91	302 39 10.4	1 23.51	. .	—14.8	+23 55 42.62	
9 *c*	June 2	ε Canis Maj. . . .	6 53 29.97	+ .300	42.954	6 52 47.32	355 19 49.2	4.38	22.1	. .	—28 46 32.81	G.
10		α Canis Min. . . .	7 32 15.24	+ .012	42.969	7 31 32.28	320 57 57.7	43.43	. .	. .	+ 5 35 57.74	
11		β Geminorum . . .	7 36 57.35	— .284	42.972	7 36 14.09	298 12 5.4	1 39.51	. .	. .	28 22 46.12	
12		Venus . . . N.L.	7 52 53.17	— .163	42 978	7 52 10.03	303 2 21.8	1 22.13	. .	+15.2	+23 31 57.14	
13		15 Argus	8 1 56.33	+ .246	42.982	8 1 13.59	350 26 22.3	9.03	. .	. .	—23 53 1.26	
14 *d*	3	ε Canis Maj. . . .	6 53 30.64	.313	43.557	6 52 47.40	355 19 50.6	4.32	22.4	. .	—28 46 34.57	G.
15		α Canis Min. . . .	7 32 15.74	+ .019	43.573	7 31 32.19	320 57 54.3	42.83	. .	. .	+ 5 36 0.24	
16		β Geminorum . . .	7 36 57.83	— .206	43.576	7 36 14.05	298 12 1.8	1 38.20	. .	. .	28 22 48.11	
17		Venus . . . S.L.	7 55 54.07	— .158	43.583	7 55 10.33	303 15 10.3	1 20.28	. .	—15.4	+23 19 37.09	
18		15 Argus	8 1 56.87	+ .352	43.586	8 1 13.64	350 26 21.4	8.90	. .	. .	—23 53 0.66	
19 *e*	12	α Canis Maj. . . .	6 39 27.37	.117	50.840	6 38 36.65	343 4 52.2	16.48	5.3	. .	16 31 6.91	G.
20		ε Canis Maj. . . .	6 53 38.23	.089	50.859	6 52 47.46	355 20 8.1	4.42	. .	. .	—28 46 34.87	
21		α^2 Geminorum . . .	7 25 58.69	.218	50.898	7 25 8.01	294 22 59.1	1 58.77	. .	. .	+32 12 28.48	
22		α Canis Min. . . .	7 32 23.19	.185	50.906	7 31 32.47	320 58 16.4	43.87	. .	. .	5 35 56.28	
23		β Geminorum . . .	7 37 4.92	.209	50.911	7 36 14.22	298 12 23.4	1 39.75	. .	. .	+28 22 45.16	
24		15 Argus	8 2 4.54	.118	50.944	8 1 13.71	350 26 39.7	9.09	. .	. .	—23 53 1.80	
25		Venus . . . N.L	8 19 2.88	.209	50.964	8 18 12.13	305 14 32.9	1 16.18	. .	+17.8	+21 19 54.29	
26 *f*	13	ε Canis Maj. . . .	6 53 40.01	.125	52.655	6 52 47.48	355 20 4.6	4.59	6.1	. .	—28 46 32.00	G.
27		α^2 Geminorum . . .	7 26 0.77	.227	52.695	7 25 8.30	294 22 56.7	1 57.07	. .	. .	+32 12 28.38	
28		α Canis Min. . . .	7 32 25.04	.200	52.700	7 31 32.54	320 58 12.9	43.23	. .	. .	+ 5 35 58.34	
29		15 Argus	8 2 6.26	.135	52.739	8 1 13.66	350 26 36.4	9.01	. .	. .	—23 52 59.38	
30		Venus . . . S.L.	8 21 8.44	.218	0 52.761	8 20 15.90	305 29 4.0	1 14.97	. .	—18.1	+21 5 57.08	
31 *g*	22	α Canis Maj. . . .	6 39 44.50	.099	1 7.804	6 38 36.79	343 4 44.3	16.21	+10.2	. .	—16 31 4.18	G.
32		ε Canis Maj. . . .	6 53 55.17	+0.076	—1 7.820	6 52 47.43	355 19 59.1	—0 4.36	. .	. .	—28 46 30.83	

a Objects quite tremulous.

b Observation of the diameter of Venus doubtful.

c Venus excessively unsteady when measuring her diameter.

d Very unfavorable observation of the diameter of the planet.

e Since the observations on the 3d the instrument has been entirely cleaned, and a new vertical wire inserted in place of A. Very indifferent observation of α^2 Geminorum.

f In the recorded observation of ε Canis Majoris, micrometers B and C were no doubt read 10″ too little. Observations of α^2 Geminorum but little better than guessing. The planet very tremulous.

g Observations all very fair.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	m. s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	June 22	α Canis Min. . . .	7 32 39.97	+0.142	—1 7.862	7 31 32.25	320 58 9.8	—0 43.06	+10.2	. .	+ 5 35 57.17	G.
2		15 Argus	8 2 21.50	.085	1 7.894	8 1 13.69	350 26 30.8	8.95	. .	. .	—23 52 57.94	
3		Venus . . . N.L.	8 34 32.30	+ .159	1 7.929	8 33 24.53	307 33 35.0	—1 8.88	. .	+20.9	+19 0 36.89	
4		ι Argus	9 14 14.34	— .022	1 7.973	9 13 6.35	25 12 37.4	+ 24.94	. .	. .	—58 39 38.43	
5 a	23	α Canis Maj. . . .	6 39 45.90	+ .112	1 9.282	6 38 36.73	343 4 43.9	— 16.04	9.8	. .	16 31 3.55	G.
6		ε Canis Maj. . . .	6 53 56.79	.046	1 9.298	6 52 47.54	355 20 0.2	4.31	. .	. .	—28 46 31.58	
7		α Canis Min. . . .	7 32 41.76	.217	1 9.337	7 31 32.64	320 58 9.8	42.64	. .	. .	+ 5 35 57.15	
8		β Geminorum . . .	7 37 23.43	.332	1 9.341	7 36 14.42	298 12 16.2	1 37.67	. .	. .	+28 22 45.78	
9		15 Argus	8 2 23.00	.074	1 9.357	8 1 13.71	350 26 29.7	8.84	. .	. .	—23 52 56.55	
10		Venus . . . S.L.	8 35 21.68	+ .278	1 9.400	8 34 12.56	307 47 45.9	—1 7.49	. .	—21.3	+18 47 7.20	
11		ι Argus	9 14 15.96	— .235	1 9.440	9 13 6.29	25 12 38.9	+ 24.69	. .	.	—58 39 39.28	
12		α Hydræ	9 21 27.67	+ .153	1 9.447	9 20 18.38	334 35 8.2	— 24.91	. .	. .	— 8 1 18.98	
13 b	24	α Canis Maj. . . .	6 39 46.84	+ .032	1 10.390	6 38 36.48	343 4 46.2	16.07	5.9	. .	—16 31 1.92	G.
14		ε Canis Maj. . . .	6 53 57.97	— .045	1 10.368	6 52 47.56	355 20 1.9	4.33	. .	. .	—28 46 29.36	
15		β Geminorum . . .	7 37 24.30	+ .289	1 10.302	7 36 14.29	298 12 18.3	1 37.87	. .	. .	+28 22 47.78	
16		15 Argus	8 2 23.89	— .013	1 10.264	8 1 13.61	350 26 34.3	8.85	. .	. .	—23 52 57.24	
17		Venus . . . N.L.	8 36 1.53	+ .226	1 10.212	8 34 51.54	308 0 29.0	1 7.13	. .	+21.6	+18 33 44.74	
18 c	28	α Canis Maj. . . .	6 39 38.54	.088	1 1.991	6 38 36.64	343 4 50.1	16.20	5.4	. .	—16 31 5.19	G.
19		α Canis Min. . . .	7 32 34.26	.185	1 1.916	7 31 32.53	320 58 14.4	43.34	. .	. .	+ 5 35 57.65	
20		Venus . . . N.L.	8 36 58.21	+ .268	1 1.827	8 35 56.65	308 51 51.4	—1 5.93	. .	+23.0	+17 42 20.24	
21		ι Argus	9 14 8.34	— .301	1 1.775	9 13 6.26	25 12 39.3	+ 25.06	. .	. .	—58 39 35.65	
22		α Hydræ	9 21 20.09	+ .118	1 1.765	9 20 18.44	334 35 14.2	— 25.27	. .	. .	— 8 1 20.22	
23 d	29	α Canis Min. . . .	7 32 32.26	.155	59.959	7 31 32.46	320 58 17.2	42.87	0.7	. .	+ 5 35 59.08	G.
24		β Geminorum . . .	7 37 13.72	+ .289	59.954	7 36 14.06	298 12 25.2	1 38.26	. .	. .	+28 22 46.47	
25		15 Argus	8 2 13.51	— .010	59.920	8 1 13.58	350 26 36.8	8.91	. .	. .	—23 52 54.48	
26		Venus . . . S.L.	8 36 48.74	+ .233	59.873	8 35 49.10	309 4 50.1	—1 4.82	. .	—23.4	+17 30 11.53	
27		ι Argus	9 14 6.27	— .388	59.821	9 13 6.06	25 12 43.1	+ 24.80	. .	. .	—58 39 34.49	
28		α Hydræ	9 21 18.06	+ .087	59.813	9 20 18.33	334 35 14.4	— 25.02	. .	. .	— 8 1 15.97	
29	30	β Geminorum . . .	7 37 12.02	+ .230	58.024	7 36 14.23	298 12 27.5	1 36.70	+ 0.3	. .	+28 22 43.01	G.
30		15 Argus	8 2 11.84	— .128	57.990	8 1 13.72	350 26 35.1	8.78	. .	. .	—23 52 52.51	
31		Venus . . . N.L.	8 37 29.71	+ .159	57.944	8 36 31.93	309 16 0.2	—1 3.70	. .	+23.7	+17 18 13.56	
32		ι Argus	9 14 4.51	— .579	57.894	9 13 6.04	25 12 44.8	+ 24.57	. .	. .	—58 39 35.56	
33		α Hydræ	9 21 16.19	— .013	57.885	9 20 18.29	334 35 13.6	— 24.80	. .	. .	— 8 1 14.99	
34 e	July 1	α Canis Min. . . .	7 32 28.39	+ .033	56.121	7 31 32.30	320 58 19.2	42.68	— 1.8	. .	+ 5 35 59.39	G.
35		Venus . . . N.L.	8 36 0.94	+ .151	56.039	8 35 5.05	309 27 39.5	—1 3.73	. .	24.1	+17 6 36.04	
36		ι Argus	9 14 2.74	— .625	55.990	9 13 6.13	25 12 47.6	+ 24.76	. .	. .	—58 39 36.45	
37		α Hydræ	9 21 14.33	— .037	55.981	9 20 18.31	334 35 15.3	— 24.97	. .	. .	8 1 14.42	
38 f	5	ε Canis Maj. . . .	6 53 36.50	+ .059	49.010	6 52 47.55	355 20 5.6	4.45	+ 2.5	. .	—28 46 29.54	G.
39		15 Argus	8 2 2.37	.101	48.930	8 1 13.54						
40		Venus . . . N.L.	8 32 28.36	+ .410	48.892	8 31 39.98	310 10 33.8	—1 4.53	. .	25.5	+16 23 36.84	
41		ι Argus	9 13 55.29	— .354	48.845	9 13 6.09	25 12 38.4	+ 25.64	. .	. .	—58 39 32.43	
42		α Hydræ	9 21 6.97	+ .238	48.836	9 20 18.37	334 35 12.5	— 25.88	. .	. .	— 8 1 15.01	
43 g	6	α Canis Min. . . .	7 32 19.43	.351	47.261	7 31 32.52	320 58 15.8	41.04	+5.5	. .	+ 5 35 56.85	G.
44		15 Argus	8 2 0.83	.137	47.228	8 1 13.74	350 26 34.2	9.14	. .	. .	—23 52 56.45	
45		Venus . . . N.L.	8 31 11.24	+0.421	— 47.196	8 30 24.47	310 20 18.3	—1 3.70	. .	+25.8	+16 13 48.21	

a Objects as sharp and steady as on the best nights.

b Tolerable observations.

c Stars seen through cirri. Micrometer B changed after observations. There was quite a sharp earthquake between 1 and 2 A. M.

d Observations through cirri. β Geminorum extremely dim and doubtful. Planet excessively unsteady.

e Observations through clouds.

f Cumuli constantly passing. Planet quite unsteady. A severe earthquake occurred at 7*h.* 37*m.*; and the adjustments of the instrument, determined after the earthquake, are not applicable to the observation of ε Canis Majoris.

g Stars blurred, and unsteady throughout.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1	July 6	ι Argus	9 13 53.46	−0.322	− 47.149	9 13 5.99	25 12 37.0	+ 25.48	+ 5.5	. .	−58 39 33.87	G.
2		α Hydræ	9 21 5.26	+ .254	47.142	9 20 18.37	334 35 8.7	− 25.71	. .	. .	8 1 14.38	
3 *a*	7	α Canis Maj. . . .	6 39 22.39	.173	45.825	6 38 36.74	343 4 47.3	16.43	3.4	. .	16 31 0.16	G.
4		ε Canis Maj. . . .	6 53 33.26	.074	45.810	6 52 47.52	355 20 1.5	4.42	. .	. .	−28 46 26.37	
5		α Canis Min. . . .	7 32 17.81	.333	45 772	7 31 32.37	320 58 13.7	43.55	. .	. .	+ 5 36 0.56	
6		15 Argus	8 1 59.17	.116	45 742	8 1 13.54	350 26 34.3	9.07	. .	. .	−23 52 54.52	
7		Venus . . . N.L.	8 29 45.21	+ .407	45.714	8 28 59.90	310 29 40.8	−1 2.92	. .	+26.1	+16 4 26.73	
8		ι Argus	9 13 52.10	− .357	45.670	9 13 6.07	25 12 38.1	+ 25.32	. .	. .	−58 39 32.71	
9		α Hydræ	9 21 3.81	+ .236	45.663	9 20 18.38	334 35 10.1	− 25.52	. .	. .	− 8 1 13.87	
10 *b*	8	ε Canis Maj. . . .	6 53 31.49	.518	44.405	6 52 47.60	355 19 50.3	4 44	19.9	. .	−28 46 31.65	G.
11		α Canis Min. . . .	7 32 16.06	.828	44.365	7 31 32.52	320 58 5.5	43.87	. .	. .	+ 5 35 52.58	
12		15 Argus	8 1 57.26	.561	44.334	8 1 13.49	350 26 23.5	9.11	. .	. .	−23 53 0.18	
13		Venus . . . N.L.	8 28 9.84	.857	44.308	8 27 26.39	310 38 24.2	−1 02.83	. .	26.4	+15 55 26.44	
14		ι Argus	9 13 50.17	.074	44.260	9 13 5.98	25 12 24.8	+ 25.40	. .	. .	−58 39 35.99	
15		α Hydræ	9 21 1.86	.686	44.253	9 20 18.29	334 34 59.3	− 25.64	. .	. .	8 1 19.45	
16 *c*	9	α Canis Maj. . . .	6 39 19.01	.621	42.877	6 38 36.75	343 4 31.9	16.43	21.6	. .	16 31 2.96	G.
17		ε Canis Maj. . . .	6 53 30.00	.518	42.860	6 52 47.66	355 19 46.4	4.42	. .	. .	−28 46 29.47	
18		α Canis Min. . . .	7 32 14.71	.828	42.819	7 31 32.72	320 58 0.4	43.64	. .	. .	+ 5 35 55.75	
19		15 Argus	8 1 55.93	.561	42.786	8 1 13.71	350 26 21.5	9.05	. .	. .	−23 52 59 94	
20		Venus . . . N.L.	8 26 25.88	.860	42.759	8 25 43.98	310 46 52.7	−1 2.00	. .	26.6	+15 46 55.21	
21		ι Argus	9 13 48.49	.074	42.707	9 13 5.86	25 12 24.6	+ 25.12	. .	. .	−58 39 37.21	
22		α Hydræ	9 21 0.26	.686	42.699	9 20 18.25	334 34 56.8	− 25.34	. .	. .	8 1 18.95	
23 *d*	10	α Canis Maj. . . .	6 39 17.54	.471	41.282	6 38 36.73	343 4 37.8	16.15	14.3	. .	16 31 1.84	G.
24		ε Canis Maj. . . .	6 53 28.51	.348	41.267	6 52 47.59	355 19 52.4	4.34	. .	. .	−28 46 28.25	
25		α Canis Min. . . .	7 32 13.17	.694	41.223	7 31 32.64	320 58 5.0	42.74	. .	. .	+ 5 35 57.55	
26		15 Argus	8 1 54.40	.400	41.190	8 1 13.61	350 26 24.1	8.87	. .	. .	−23 52 55.42	
27		Venus . . . N.L.	8 24 33.68	+ .766	41.164	8 23 52.28	310 54 56.3	−1 0.60	. .	26.9	+15 38 57.21	
28		ι Argus	9 13 47.24	− .187	41.110	9 13 5.94	25 12 28.1	+ 24.71	. .	. .	−58 39 33.00	
29		α Hydræ	9 20 58.97	+ .549	41.102	9 20 18.42	334 34 59.4	− 24.95	. .	. .	8 1 14.64	
30	13	α Canis Maj. . . .	6 39 12.71	.491	36.449	6 38 36.75	343 4 34.0	16.47	16.5	. .	16 30 59.92	G.
31		ε Canis Maj. . .	6 53 23.66	.371	36.433	6 52 47.60	355 19 50.4	4.43	. .	. .	−28 46 28.36	
32		α Canis Min. . . .	7 32 8.31	.712	36.391	7 31 32.63	320 58 5.0	43.87	. .	. .	+ 5 35 56.48	
33		15 Argus	8 1 49.52	.404	36.358	8 1 13.57	350 26 21.1	9.11	. .	. .	−23 52 54.38	
34 *e*		Venus . . . N.L.	8 18 12.24	.767	36.341	8 17 36.67	311 16 16.9	1 1.35	. .	27.6	+15 17 34.46	
35		α Hydræ	9 20 54.04	.567	36.272	9 20 18.36	334 34.58.2	25.53	. .	. .	− 8 1 15.06	
36	18	α Canis Min. . . .	7 32 1.69	.473	29.663	7 31 32.50	320 58 0.4	43.79	18.7	. .	+ 5 35 58.80	G.
37 *f*		Venus . . . N.L.	8 3 46.58	.587	29.638	8 3 17.53	311 42 20.8	1 0.52	. .	+28.4	+14 51 26.73	
38		α Hydræ	9 20 47.40	.506	29.577	9 20 18.33	334 34 53.1	25.68	. .	. .	− 8 1 12.01	
39	26	ε Canis Maj. . . .	6 53 7.80	.549	20.505	6 52 47.84	355 19 44.9	4.66	19.6	. .	−28 46 25.73	
40		α Canis Min. . . .	7 31 52.50	.624	20.477	7 31 32.65	320 57 57.2	43.95	. .	. .	+ 5 36 1.26	
41		Venus . . . S.L.	7 42 44.68	.578	20.474	7 42 24.78	311 59 48.3	1 0.09	. .	−27.8	+14 34·54.10	
42 *g*		15 Argus	8 1 33 65	.535	20.456	8 1 13.73	350 26 12.4	9.12	. .	. .	−23 52 48.77	
43	29	α Canis Min. . . .	7 31 49.43	.656	17.258	7 31 32.83	320 58 0.2	43.96	+17.7	. .	+ 5 36 0.17	G.
44		Venus . . . N.L.	7 36 19.80	+0.696	− 17.255	7 36 3.24	311 58 10.7	−1 0.22	. .	+27.3	+14 35 38.63	

a Stars blurred and unsteady. After observations, lifted the circle, and cleaned pivots and friction-rollers.

b Venus extremely unsteady; stars sometimes good. Micrometers B and C were changed before observations.

c Venus very unsteady and not satisfactory; stars sometimes good.

d Except of α Canis Minoris, the observations generally were satisfactory.

e The southern cusp of Venus was so indistinct that the measure of her diameter is doubtful.

f Venus quite steady.

g 15 Argus not visible at times, and the observation not to be relied on.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for		Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
				Inst.	Clock.							
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 *a*	July 29	15 Argus	8 1 30.66	+0.380	— 17.235	8 1 13.81	350 26 14.2	— 9.13	. . .	.	—23 52 48.66	G.
2		*α* Hydræ	9 20 34.91	.526	17.176	9 20 18.26	334 34 53.4	25.63	. .	. .	8 1 11.36	
3	30	*α* Canis Maj. . . .	6 38 52.71	.460	16.027	6 38 37.15	343 4 26.9	16.44	+21.0	. .	16 30 57.35	G.
4		*ε* Canis Maj. . . .	6 53 3.54	.347	16.015	6 52 47.87	355 19 41.3	4.42	. .	. .	—28 46 23.77	
5		Venus . . . N.L.	7 34 26.87	.712	15.981	7 34 11.60	311 56 53.3	59.92	. .	+27.0	+14 36 52.73	
6		15 Argus	8 1 29.47	.395	15.958	8 1 13.91	350 26 13.7	9.08	. .	. .	—23 52 51.51	
7 *b*	31	*α* Canis Maj. . . .	6 38 51.76	.446	15.003	6 38 37.20	343 4 29.1	16.40	18.7	. .	—16 30 57.29	G.
8		*ε* Canis Maj. . . .	6 53 2.64	.332	14.992	6 52 47.98	355 19 44.1	4.42	. .	. .	—28 46 24.27	
9		Venus . . . N.L.	7 32 42.23	.702	14.961	7 32 27.97	311 55 13.1	59.91	. .	26.8	+14 38 35.42	
10 *c*	Aug. 4	*α* Canis Maj. . . .	6 38 47.13	.575	10.514	6 38 37.19	343 4 29.5	16.51	19.8	. .	—16 30 58.68	G.
11		*ε* Canis Maj. . . .	6 52 58.10	.471	10.503	6 52 48.07	355 19 41.0	4.44	. .	. .	—28 46 22.25	
12		Venus . . . N.L.	7 27 15.66	.809	10.477	7 27 5.99	311 46 6.8	1 0.40	. .	25.6	+14 47 42.31	
13		*β* Geminorum . . .	7 36 24.40	.925	10.469	7 36 14.86	298 12 12.3	1 40.20	. .	. .	+28 22 42.21	
14		15 Argus	8 1 23.64	.514	10.450	8 1 13.70	350 26 13.5	9.07	. .	. .	—23 52 50.12	
15 *d*	5	*ε* Canis Maj. . . .	6 52 57.01	.362	9.286	6 52 48.09	355 19 42.4	4.39	16.9	. .	—28 46 20.80	G.
16		Venus . . . N.L.	7 26 18.50	.639	9.257	7 26 9.88	311 43 16.4	1 0.20	. .	25.3	+14 50 35.71	
17		*β* Geminorum . . .	7 36 23.33	.734	9.249	7 36 14.82	298 12 12.7	1 39.62	. .	. .	+28 22 44.13	
18		15 Argus	8 1 22.80	.381	9.228	8 1 13.95	350 26 15.0	8.99	. .	. .	—23 52 48.80	
19 *e*	6	*ε* Canis Maj. . . .	6 52 55.57	.379	8.005	6 52 47.98	355 19 41.9	4.39	17.0	. .	—28 46 20.40	G.
20		Venus . . . N.L.	7 25 30.94	.782	7.975	7 25 23.75	311 40 14.6	1 0.09	. .	25.0	+14 53 37.60	
21		*α* Canis Min. . . .	7 31 40.30	.729	7.969	7 31 33.06	320 57 59.9	43.36	. .	. .	5 36 0.57	
22		15 Argus	8 1 21.46	.431	7.943	8 1 13.95						
23 *f*	7	Venus . . . N.L.	7 24 53.27	.752	6.488	7 24 47.53	311 37 5.4	59.82	15.7	24.7	14 56 48.13	G.
24		*α* Canis Min. . . .	7 31 38.70	.690	6.481	7 31 32.91	320 58 2.0	43.02	. .	. .	+ 5 35 59.43	
25		15 Argus	8 1 19.93	.383	6.429	8 1 13.88	350 26 17.0	8.95	. .	. .	—23 52 49.64	
26 *g*	8	Venus . . . N.L.	7 24 25 30	.669	4.682	7 24 21.29	311 33 44.9	59.71	13.9	24.4	+15 0 10.62	G.
27		*α* Canis Min. . . .	7 31 36.97	.581	4.672	7 31 32 88	320 58 2.8	42.97	. .	. .	5 36 0.38	
28		*β* Geminorum . . .	7 36 18.57	.830	4 667	7 36 14.73	298 12 15.7	1 38.44	. .	. .	+28 22 42.95	
29		15 Argus	8 1 18.33	.252	4.636	8 1 13.95	350 26 17.4	8.91	. .	. .	—23 52 48.28	
30 *h*	10	Venus . . . N.L.	7 23 59.04	.749	1.195	7 23 58.59	311 26 48.3	1 1.24	15.1	23.7	+15 7 8.25	G.
31		*α* Canis Min. . . .	7 31 33.41	.683	1.185	7 31 32.91	320 58 1.2	43.77	. .	. .	5 36 1.58	
32		*β* Geminorum . . .	7 36 15.10	.891	— 1.180	7 36 14.81	298 12 14.5	1 40.22	. .	. .	+28 22 44.73	
33 *i*	12	*ε* Canis Maj. . . .	6 52 46.19	.366	+ 1.656	6 52 48.21	355 19 42.6	4.48	17.7	. .	—28 46 21.71	G.
34		Venus . . . N.L.	7 24 12.46	.820	1.685	7 24 14.96	311 19 31.3	1 2.06	. .	22.8	+15 14 24.37	
35		*α* Canis Min. . . .	7 31 30.53	.752	1.693	7 31 32.96	320 58 1.4	44.27	. .	. .	5 35 59.38	
36		*β* Geminorum . . .	7 36 12.23	.969	1.696	7 36 14.89	298 12 17.0	1 41.27	. .	. .	+28 22 40.68	
37		15 Argus	8 1 11.90	.425	1.720	8 1 14.05	350 26 12.2	9.17	. .	. .	—23 52 46.62	
38 *k*	13	Venus . . . N.L.	7 24 33.36	.821	2.997	7 24 37.18	311 15 53.7	1 1.07	14.0	22.4	+15 18 5.08	G.
39		*α* Canis Min. . . .	7 31 29.34	.752	3.002	7 31 33.09	320 58 0.7	43.46	. .	. .	5 36 2.87	
40		*β* Geminorum . . .	7 36 11.11	.969	3.007	7 36 15.09	298 12 16.0	1 39.51	. .	. .	28 22 43.62	
41 *l*	14	Venus . . . N.L.	7 25 3.26	.759	4.443	7 25 8.46	311 12 17.7	1 0.37	+12.4	+22.0	15 21 42.38	G.
42		*α* Canis Min. . . .	7 31 27.87	.671	4.449	7 31 32.99	320 58 2.8	42.89	. .	. .	5 36 1.80	
43		*β* Geminorum . . .	7 36 9.51	+0.921	+ 4.455	7 36 14.89	298 12 17 5	—1 38.26	. .	. .	+28 22 42.47	

a Transit of 15 Argus observed through clouds.
b Objects extremely tremulous.
c Objects tolerably sharp and steady.
d All tolerably good observations.
e Observations through thin cirri, but good, unless the cusps of Venus were not sharp enough for accurate measurement of the diameter.
f Objects rather tremulous and unsteady.
g All good observations.
h The dense fog covering the city since yesterday morning broke away suddenly at 7*h*. sidereal time. Objects in this day's observations blurred and very unsteady.
i Objects tremulous.
k Objects quite steady.
l Cirri rendered cusps dim; objects not steady.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for		Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
				Inst.	Clock.							
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ″	′ ″	″	″	° ′ ″	
1 *a*	Aug, 16	Venus . . . N.L.	7 26 29.43	+0.779	+ 7.869	7 26 38.08	311 5 12.6	–1 1.03	+12.8	+21.4	+15 28 48.34	G.
2		*α* Canis Min. . . .	7 31 24.53	.666	7.874	7 31 33.07	320 58 1.7	– 43.14	. .	. .	+ 5 36 2.75	
3 *b*	21	*α* Argus	6 20 24.03	.641	15.241	6 20 39.91	19 9 44.3	+ 19.36	15.9	. .	–52 36 45.45	G.
4		*α* Canis Maj. . . .	6 38 21.87	.560	15.257	6 38 37.69	343 4 28.7	– 16.91	. .	. .	–16 30 53.58	
5		Venus . . . N.L.	7 32 30.43	.951	15.303	7 32 46.68	310 49 6.9	1 3.75	. .	19.8	+15 44 55.26	
6		15 Argus	8 0 58.36	.462	15.329	8 1 14.15	350 26 11.9	9.25	. .	. .	–23 52 44.44	
7 *c*	22	*α* Canis Maj. . . .	6 38 20.69	.467	16.461	6 38 37.62	343 4 27.9	16.61	14.3	. .	16 30 51.48	G.
8		*ε* Canis Maj. . . .	6 52 31.60	.313	16.477	6 52 48.39	355 19 40.0	4.46	. .	. .	–28 46 15.73	
9		Venus . . . N.L.	7 34 5.88	.825	16.516	7 34 23.22	310 46 22.0	1 2.61	. .	19.5	+15 47 40.92	
10		15 Argus	8 0 57.31	.378	+ 16.537	8 1 14.22	350 26 12.9	9.07	. .	. .	–23 52 44.02	
11 *d*	23	*ε* Canis Maj. . . .	6 53 1.49	.262	– 13.344	6 52 48.41	355 19 41.6	4.46	14.4	. .	–28 46 17.43	G.
12		*α* Canis Min. . . .	7 31 19.83	.693	+ 12.590	7 31 33.11	320 58 2.6	44.07	. .	. .	+ 5 36 1.18	
13		Venus . . . N.L.	7 35 53.28	.794	+ 12.590	7 36 6.38	310 43 52.0	1 3.04	. .	19.2	+15 50 11.55	
14 *e*	28	*α* Canis Maj. . . .	6 38 37.46	.462	– 0.189	6 38 37.73	343 4 24.3	16.55	16.7	. .	–16 30 50.34	G.
15		*ε* Canis Maj. . . .	6 52 48.40	.328	0.180	6 52 48.55	355 19 37.3	4.45	. .	. .	–28 46 15.44	
16		*α* Canis Min. . . .	7 31 32.79	.674	0.161	7 31 33.30	320 57 57.9	43.91	. .	. .	+ 5 36 3.42	
17		*β* Geminorum . . .	7 36 14.57	.854	0.158	7 36 15.26	298 12 14.5	1 40.55	. .	. .	28 22 43.46	
18		Venus . . . N.L.	7 46 23.21	.734	0.152	7 46 23.79	310 34 48.3	1 3.00	. .	17.8	+15 59 14.31	
19		15 Argus	8 1 14.01	.394	– 0.145	8 1 14.26	. . . .	. . .	. .	. .	. . . .	
20 *f*	31	*α* Canis Maj. . . .	6 38 34.17	.504	+ 3.136	6 38 37.81	343 4 23.7	16.86	17.4	. .	–16 30 50.13	G.
21		*ε* Canis Maj. . . .	6 52 44.99	.438	3.151	6 52 48.57	355 19 37.4	4.52	. .	. .	–28 46 16.17	
22		*α* Canis Min. . . .	7 31 29.53	.692	3.183	7 31 33.40	320 57 59.3	44.64	. .	. .	+ 5 36 2.05	
23		*β* Geminorum . . .	7 36 11.26	.828	3.189	7 36 15.28	298 12 18.8	1 42.03	. .	. .	28 22 39.94	
24		Venus . . . N.L.	7 53 40.70	.730	3.202	7 53 44.63	310 32 55.8	1 4.11	. .	16.9	+16 1 8.12	
25		15 Argus	8 1 10.73	.430	3.209	8 1 14.37	350 26 9.0	9.26	. .	. .	–23 52 43.03	
26 *g*	Sept. 1	*ε* Canis Maj. . . .	6 52 43.79	.424	4.453	6 52 48.67	355 19 34.9	4.52	18.3	. .	–28 46 14.57	G.
27		*α* Canis Min. . . .	7 31 28.24	.801	4.486	7 31 33.53	320 57 57.0	44.50	. .	. .	+ 5 36 3.31	
28		*β* Geminorum . . .	7 36 9.93	1.002	4.491	7 36 15.42	298 12 14.8	1 41.95	. .	. .	28 22 42.96	
29		Venus . . . N.L.	7 56 16.94	.867	4.508	7 56 22.31	310 32 58.9	1 3.79	. .	16.7	+16 1 4.00	
30		15 Argus	8 1 9.40	.479	4.513	8 1 14.39	350 26 8.1	9.22	. .	. .	–23 52 43.07	
31 *h*	2	*α* Canis Maj. . . .	6 38 31.69	.478	5.757	6 38 37.92	343 4 25.3	16.69	15.5	. .	16 30 50.00	G.
32		*ε* Canis Maj. . . .	6 52 42.66	.335	5.772	6 52 48.77	355 19 37.8	4.49	. .	. .	–28 46 14.70	
33		*α* Canis Min. . . .	7 31 26.99	.716	5.805	7 31 33.31	320 57 59.0	44.19	. .	. .	+ 5 36 3.80	
34		*β* Geminorum . . .	7 36 8.69	.960	5.810	7 36 15.46	298 12 17.2	1 41.23	. .	. .	28 22 42.64	
35		Venus . . . N.L.	7 58 58.04	.813	5.828	7 59 4.68	310 33 23.8	1 3.47	. .	16.5	+16 0 41.78	
36 *i*	3	*ε* Canis Maj. . . .	6 52 41.30	.327	7.019	6 52 48.64	355 19 40.6	4.45	13.5	. .	–28 46 15.54	G.
37		*α* Canis Min. . . .	7 31 25.66	.725	7.058	7 31 33.44	320 58 1.6	43.93	. .	. .	+ 5 36 2.94	
38		*β* Geminorum . . .	7 36 7.44	.956	7.063	7 36 15.46	298 12 19.0	1 40.67	. .	. .	28 22 42.28	
39		Venus . . . N.L.	8 1 43.90	.808	7.068	8 1 51.78	310 34 13.7	1 2.96	. .	16.3	+15 59 53.57	
40 *k*	Sept. 6	*ε* Canis Maj. . . .	6 52 37.88	.385	10.466	6 52 48.73	355 19 37.4	4.52	+16.4	. .	–28 46 15.17	G.
41		*α* Canis Min. . . .	7 31 32.30	.770	10.500	7 31 33.57	320 57 58.8	44.59	. .	. .	+ 5 36 3.50	
42		*β* Geminorum . . .	7 36 3.91	.984	10.506	7 36 15.40	298 12 17.6	1 42.18	. .	. .	28 22 42.39	
43		Venus . . . N.L.	8 10 28.28	+0.843	+ 10.540	8 10 39.66	310 38 57.6	–1 3.75	. .	+15.7	+15 56 8.16	

a Observations through cirri; objects tolerably steady.
b Objects very tremulous and unsteady.
c Objects excessively unsteady.
d The clock having stopped at 7*h*., dismounted and cleaned it after observations.
e Bad images, but tolerably steady.
f Bad images, though tolerably steady.
g Tolerably steady.
h Comparatively quite steady.
i Objects tolerably steady.
k Objects sharp, and planet comparatively steady. Aperture reduced to two inches for planet.

No. for reference.	Date.	Object.	Observed transit reduced to mean of wires.	Corrections for Inst.	Corrections for Clock.	Apparent A. R. observed.	Circle reading, mean of four microscopes.	Refraction.	Nadir.	Corr'n for semid.	Observed apparent declination.	Observer.
	1852.		h. m. s.	s.	s.	h. m. s.	° ′ ′	′ ″	″	″	° ′ ″	
1 a	Sept. 7	ε Canis Maj. . . .	6 52 36.43	+0.403	+ 11.892	6 52 48.72	355 19 39.1	— 4.50	+15.9	. .	—28 46 16.39	G.
2		α Canis Min. . . .	7 31 20.83	.932	11.928	7 31 33.69	320 58 0.8	44.24	. .	. .	+ 5 36 1.61	
3		β Geminorum . . .	7 36 2.29	1.245	11.934	7 36 15.47	298 12 19.1	1 41.32	. .	. .	28 22 40.43	
4		Venus . . . N.L.	8 13 30.83	1.047	11.969	8 13 43.85	310 41 21.2	1 2.94	. .	+15.5	+15 52 44.45	
5 a	8	ε Canis Maj. . . .	6 52 35.24	.359	13.312	6 52 48.91	355 19 39.9	4.45	+14.5	. .	—28 46 15.84	G.
6		α Canis Min. . . .	7 31 19.50	.898	13.348	7 31 33.75	320 57 59.7	43.81	. .	. .	+ 5 36 3.72	
7		β Geminorum . . .	7 36 1.16	1.224	13.354	7 36 15.74	298 12 19.0	1 40.29	. .	. .	28 22 40.90	
8		Venus . . . N.L.	8 16 37.46	+1.019	+ 13.394	8 16 51.87	310 44 9.8	—1 2.34	. .	+15.3	+15 49 56.85	

a Objects sharp, but very tremulous. Aperture for all, two inches.

HORIZONTAL AND VERTICAL DIAMETERS

OF

MARS AND VENUS,

FROM THE

DIFFERENTIAL AND MERIDIAN OBSERVATIONS,

AT SANTIAGO DE CHILE,

COMPARED WITH

THE NAUTICAL ALMANAC.

DIAMETERS OF MARS:
1849-50.

Date.	Observed horizontal.	N. A. horizontal.	Observed —N. A.	Observed vertical.	N. A. vertical.	Observed —N. A. ver.	Remarks.
1849.	"	"	"	"	"	"	
Dec. 10	17.06	17.10	—0.04	15.88	15.40	+0.48	Blazing and unsteady.
11	13.42	17.07	—3.65	20.07	15.36	4.71	Mars not very steady.
11	18.16	17.07	+1.09	16.86	15.36	1.50	Do.
11	. .	. .	. .	18.27	15.36	2.91	Do.
12	24.73	17.04	7.69	19.86	15.32	4.54	Not favorable.
12	21.22	17.04	4.18	18.18	15.32	2.86	
13	20.59	17.01	3.58	18.28	15.28	3.00	Pretty fair measures.
14	22.65	16.97	5.68	17.94	15.24	2.70	Not as good as yesterday.
15	18.64	16.94	. .	18.71	15.20	3.51	By no means satisfactory.
15	19.14	16.94	+2.20	18.91	15.20	3.71	
16	15.91	16.91	—1.00	17.99	15.17	2.82	Tolerably good, but occasional wave-like motion.
17	18.00	16.88	+1.12	15.82	15.13	0.69	Uniformly good measures.
18	19.19	16.85	2.34	16.44	15.10	1.34	Disc of planet badly defined.
20	20.12	16.83	3.29	16.76	15.03	1.73	Badly defined and wavy a part of the time.
20	20.34	16.83	+3.51	16.04	15.03	1.01	
21	18.15	16.80	—0.65	19.22	15.00	4.22	Both objects seen through haze.
22	23.78	16.73	+6.05	18.16	14.93	3.23	Blazing and unsteady.
23	19.79	16.65	3.14	17.21	14.86	2.35	Very flaring, with irregular motion.
24	17.16	16.57	0.59	17.86	14.80	3.06	Generally very good measures.
25	17.29	16.50	0.79	17.02	14.73	2.29	Tolerably fair night.
26	18.82	16.44	2.38	17.76	14.66	3.10	Better than usual.
27	17.69	16.39	1.30	17.78	14.60	3.18	Blazing and unsteady.
30	21.91	16.20	5.71	17.48	14.40	3.08	Quite a favorable night.
31	17.94	16.10	1.84	16.79	14.20	2.59	Doubtful, because of the vicinity of the objects in A. R.
1850.							
Jan. 1	18.82	16.00	2.82	17.85	14.11	3.74	Better results than usual.
2	19.05	15.90	3.15	17.40	14.02	3.38	Measures doubtful from several causes.
4	18.96	15.60	3.36	17.12	13.84	3.28	Not favorable, though part of the measures good.
6	18.74	15.30	+3.44	17.16	13.66	3.50	Not satisfactory results.
6	14.61	15.30	—0.69	16.65	13.66	2.99	
7	16.72	15.15	+1.57	18.01	13.60	4.41	Variable in value.
8	18.02	15.00	3.02	17.64	13.40	4.24	Very fair night's work.
9	19.18	14.85	3.33	16.71	13.40	3.31	Same as yesterday.
10	19.56	14.70	4.86	16.92	13.20	3.72	Regarded as about the mean.
11	17.68	14.55	3.13	16.15	13.20	2.95	Measures more accurate than usual.
12	16.40	14.40	2.00	15.98	13.00	2.98	Generally very good measures.
13	17.24	14.30	2.94	17.93	13.00	4.93	Do. do.
14	17.57	14.20	3.37	15.99	12.80	3.19	Planet flaring and unsteady.
15	18.93	14.10	4.83	16.40	12.80	3.60	Very fair observations throughout.
15	16.71	14.10	2.61	13.74	12.80	0.94	
16	18.35	14.00	4.35	16.33	12.60	3.73	Flickering light and unsteady motion.
17	17.00	13.90	3.10	16.50	12.50	4.00	Moderately fair observations.
18	16.41	13.80	2.61	17.14	12.40	4.74	Very unfavorable night.
19	15.74	13.70	2.04	15.65	12.20	3.45	Only one measure.
20	14.32	13.60	0.72	13.47	12.20	1.27	An extremely good night, and reliable measures.
21	17.11	13.50	3.61	15.23	12.00	3.23	Measures not satisfactory.
22	15.76	13.35	2.41	14.10	12.00	2.10	Regarded extremely satisfactory.
23	14.70	13.20	1.50	14.22	11.80	2.42	Nothing remarkable in measures.
23	14.45	13.20	+1.25	13.65	11.80	1.85	
24	12.62	13.10	—0.48	13.86	11.60	+2.26	One of the very best nights.

Date.	Observed horizontal.	N. A. horizontal.	Observed —N. A.	Observed vertical.	N. A. vertical.	Observed —N. A. ver.	Remarks.
1850.	"	"	"	"	"	"	
Jan. 25	13.15	13.00	+0.15	13.09	11.40	+1.69	Measures generally very good.
26	13.93	12.90	1.03	15.25	11.40	3.85	Hazy night, and the star indistinct.
27	13.30	12.75	0.55	12.22	11.20	1.02	Sharp images, and satisfactory measures.
28	17.25	12.60	4.65	13.84	11.20	2.64	Star scarcely observable; observations discordant.
29	15.33	12.30	3.03	12 77	11.00	1.77	Ordinarily fair results.
31	13.30	12.00	+1.30	12.42	10.80	+1.62	An extremely favorable night.
Mean of 54 observations......			+2.349	55 observations......		+2.862	

DIAMETERS OF MARS, 1851–52.

Date.	Observed vertical.	N. A. vertical.	Observed —N. A.	Observed horizont'l.	N. A. horizont'l.	Observed —N. A.	Remarks.
1851.	"	"	"	"	"	"	
Dec. 16	14.70	11.20	+3.50	9.97	11.70	—1.73	Early observations, images blurred and unsteady; latter sharp and steady.
16	13.14	11.20	1.94	10.75	11.70	—0.95	
19	13.61	11.40	+2.21	13.25	12.00	+1.25	At commencement of observations both objects flaring and unsteady; temperature falling; atmosphere moist. The white zone about the north pole of Mars distinctly visible, and marked by a dark line. The zone apparently one-sixth diameter of planet.
19	11.27	11.40	—0.13	15.26	12.00	3.26	
19	12.58	11.40	+1.18	16.37	12 00	4 37	
28	14.62	12.20	2.42	17.64	12.90	4.74	Measures satisfactory. White zone not so dark.
29	12.61	12.40	0.21	14.94	13.20	1.74	At commencement images flaring and unsteady; at the close excellent.
30	13.48	12.40	1.08	17.90	13.20	4.70	Fine night; images sharp and clear.
31	13.60	12.60	1.00	16.65	13.50	3.15	Same as last night.
1852.							
Jan. 1	13.85	12.60	1.25	17.38	13.50	3.88	Fine night, and measures satisfactory.
2	14.10	12.60	1.50	17.24	13.50	3.74	Same as last night.
4	13.96	12.80	1.16	17.66	13.80	3.86	Earlier observations images flaring and tremulous; latter steady; measures fine.
5	12.85	12.80	0.05	15.17	13.80	1.37	No sharp images during the observations; planet slightly tremulous all the time.
6	13.36	13.00	0.36	15.49	14.10	1.39	Both objects were sharp, but their images dim.
7	14.15	13.00	1.15	17.01	14.10	+2.91	Generally blurred and tremulous.
8	13.77	13.00	+0.77	13.86	14.10	—0.24	Objects badly defined and wavy.
8	12.90	13.00	—0.10	17.46	14.10	+3.36	
9	13.43	13.00	+0.43	18.41	14.10	4.31	Night fair; observations satisfactory, though both objects were wavy in motion.
10	14.14	13.20	0.94	17.10	14.40	2.70	Earlier observations images badly defined and unsteady; afterward the objects were sharp and measures good.
11	14.55	13.20	1.35	15.75	14.40	1.35	Early part of night cloudy; latter part clear; measures very fair.
12	15.00	13.20	1.80	18.07	14.40	+3.67	Objects blurred and unsteady; measures unsatisfactory until towards the close of the observations.
12	13.80	13.20	0.60	14.12	14.40	—0.28	
13	14.19	13.20	0.99	17.80	14.40	+3.40	Images blurred, flashing, and whirling.
14	14.44	13.40	1.04	15.90	14.40	1.50	Fine night; satisfactory measures throughout.
16	13.84	13.40	0.44	17.54	14.70	2.84	At commencement objects indistinct and tremulous, but improving towards the close.
17	13.63	13.40	0.23	17.44	14.70	2.74	Objects well defined and steady throughout.
20	14.08	13.40	+0.68	17.74	14.70	3.04	Planet flaring; the measures, however, are tolerably fair.
20	13.26	13.40	—0.14	15.75	14.70	+1.05	
21	15.10	13.40	+1.70	12.38	14.70	—2.32	Observations discontinued in consequence of haze obscuring the objects.
22	14.96	13.40	1.56	18.28	14.70	+3.58	Planet sharp and steady; measures very fine.
23	14.74	13.40	1.34	17.45	15.00	2.45	Objects a little blurred and tremulous at times, but measures satisfactory.
24	15.02	13.40	1.62	19.06	15.00	4.06	Commencement, images blurred and unsteady; subsequently sharp and equable.
25	16.27	13.40	2.87	18.17	15.00	3.17	Generally ill defined and unsteady.
27	13.54	13.40	0.14	16.46	15.00	1.46	A very satisfactory night in all respects.
28	13.66	13.40	0.26	16.31	15.00	1.31	Not quite as good as last night.
29	13.50	13.40	+0.10	16.96	15.00	+1.96	Fine night, but the measures are not very satisfactory.
30	13.04	13.40	—0.36	14.93	15.00	—0.07	Fine night; large number of the measures doubtful, in consequence of the comparing star being not brighter than 11 or 12¼ magnitude, and very dim under light.
31	13.18	13.20	—0.02	15.92	14.70	+1.22	Images excellent, instrument steady, and measures satisfactory.
Feb. 1	13.27	13.20	+0.07	10.84	14.70	—3.86	The planet and star blurred; the measures are, therefore, not good.
2	13.52	13.20	+0.32	16.59	14.70	+1.89	Fine night; objects a little wavy, but measures very satisfactory.
3	13.19	13.20	—0.01	. .	. .	. .	Cirro strati all over the heavens; objects indistinct and unsteady.
7	12.96	13.00	—0.04	18.03	14.40	3.63	Night unfavorable; images neither sharp nor steady; measure not more than fair.
8	13.35	12.80	+0.55	15.72	14.40	1.32	Same as last night.
9	12.99	12.80	+0.19	15.92	14.40	+1.52	Fine night; clean, steady images; measures satisfactory.
9	12.71	12.80	—0.09	14.38	14.40	—0.02	

Date.	Observed vertical.	N. A. vertical.	Observed —N. A.	Observed horizont'l.	N. A. horizont'l	Observed —N. A.	Remarks.
1852.	"	"	"	"	"	"	
Feb. 10	12.79	12 60	+0.19	16.04	14.10	+1.94	Night excellent; images sharp and steady.
11	12.78	12.60	+0.18	18.14	14.10	+4.04	Same as preceding.
11	12.01	12.60	—0.59	13.51	14.10	—0.59	
13	11.79	12.40	0.61	15.09	13.80	+1.29	Images blurred and unsteady; measures only tolerable.
13	12.34	12.40	0.06	15.54	13.80	1.74	
14	12.03	12.40	—0.37	14.29	13.80	0.49	Star very indistinct at times, and the images blurred and wavy.
15	12.67	12.40	+0.27	14.68	13.80	0.88	Same remarks applicable as last night.
16	12.54	12.20	+0.34	15.17	13.50	1.67	Earlier observations images blurred and unsteady; latter much better.
17	11.78	12.20	—0.42	14.73	13.50	1.23	At commencement images badly defined, motion not uniform; later they became better, and the work is very satisfactory.
19	11.46	12.00	0.54	14.32	13.50	0.82	Much haze; planet tolerably steady; comparing star dim; measures of it in many cases very doubtful.
20	11.51	11.80	0.29	15.56	13.20	2.36	The evening good; measures generally satisfactory.
21	11.53	11.60	0.07	14.70	12.90	1.80	Fine night; images sharp and steady; measures satisfactory throughout.
22	11.45	11.60	0.15	14.13	12.90	1.23	Blurred and unsteady; measures but little better than guesses.
23	10.37	11.60	—1.23	14.38	12.90	+1.48	Sharp and steady.
24	11.49	11.40	+0.09	11.74	12.60	—0.86	Clean images and steady; measures generally very fair.
25	10.98	11.40	—0.42	14.93	12.60	+2.33	Fine night; images clean and steady; measures very fair.
26	11.21	11.20	+0.01	13.21	12.60	+0.61	Very fine night; no better images nor more satisfactory work.
27	11.12	11.20	—0.08	12.19	12.60	—0.41	Same as last night.
28	11.19	11.00	+0.19	9.34	12.30	—2.96	Much blurred and very indistinct; measures not satisfactory.
28	10.60	11.00	—0.40	14.72	12.30	+2.42	
29	10.07	11.00	0.93	13.72	12.30	+1.42	Owing to cirri, images blurred and unsteady; star often very indistinct.
Mar. 1	10.46	10.80	0.34	11.02	12.00	—0.98	Generally sharp and good.
2	10.66	10.80	0.14	. .	. .	. .	Fine night; images sharp and steady; measures satisfactory.
3	10.41	10.60	0.19	. .	. .	. .	Objects badly defined, and indistinct; observations unsatisfactory.
4	9.96	10.60	0.64	13.16	11.70	+1.46	Night fine; images steady; measures satisfactory.
6	10.02	10.40	0.38	12.72	11.70	+1.02	Blurred and unsteady at commencement; subsequently better defined and sharper.
7	10.36	10.40	0.04	9.40	11.70	—2.30	Badly defined; constant tremulous motion.
8	10.02	10.20	0.18	12.44	11.40	+1.04	Remarks of last night applicable.
9	9.70	10.20	—0.50	12.28	11.40	0.88	Unsurpassed in good definition and steady motion by any night during the series.
10	11.74	10.00	+1.74	12.56	11.10	1.46	Last night's remarks applicable.
11	9.72	10.00	—0.28	11.31	11.10	0.21	Same as last night.
12	9.60	9.80	0.20	11.44	10.80	+0.64	Good images; satisfactory measures.
12	9.63	9.80	0.17	10.33	10.80	—0.47	
13	9.27	9.80	0.53	. .	. .	. .	Never better or steadier measures.
14	9.46	9.80	0.34	12.44	10.80	+1.64	Quite steady, but dim all the evening.
15	9.27	9.60	—0.33	10.38	10.50	—0.12	A blur about the planet and an unsteadiness of motion, somewhat impairs the observations.
Mean of 81 observations .			+0.379	77 observations .		+1.504	

VERTICAL DIAMETERS OF VENUS, 1850--51.

Date.	Mer. circle.	N. A.	C —N. A.	Equatorial.	N. A.	E —N. A.	Remarks.
1850.	"	"	"	"	"	"	
Oct. 19	29.88	28.88	+1.00				
20	29.74	29.28	0.46				
21	31.28	29.64	1.64				
22	31.28	29.88	1.40	. .	. .	. .	Passing cirri.
23	31.84	30.28	1.56				
24	31.28	30.68	0.60				
25	31.56	31.32	+0.24				
26	31.56	31.92	—0.36				
27	31.56	32.48	0.92				
30	33.23	33.72	0.49				
Nov. 1	33.23	34.72	—1.49				
5	39.38	37.12	+2.26				
7	38.12	38.12	±0.00				
8	39.66	38.72	+0.94				
10	42.45	40.12	2.33	. .	. .	. .	Seen through clouds.
11	42.73	40.72	2.01				
13	43.57	42.16	1.41				
14	44.68	42.92	1.76				
15	. .	. .	. .	45.18	43.72	+1.46	Mean of five measures at 22*h*. 56*m*.
16	45.52	44.32	+1.20				
17	44.54	44.96	—0.42				
18	47.47	45.78	+1.69				
19	47.47	46.56	0.91	48.55	46.73	1.82	Seen through cirri. Mean of four measures at 23*h*. 20*m*.
20	48.59	47.36	1.23	. .	. .	. .	Cirri passing all the time.
21	50.13	48.12	2.01				
23	52.93	49.60	3.33	. .	. .	. .	Very unsteady. Observed by Lieut. MacRae.
26	52.93	52.16	0.77				
27	53.34	52.92	0.42				
28	54.32	53.56	0.76				
Dec. 2	59.48	56.76	2.72				
4	58.37	58.12	0.25	. .	. .	. .	Passing cumuli during the observation.
5	60.92	58.72	2.20	60.91	58.88	2.03	Mean of ten measures at 0*h*. 30*m*.
8	61.72	60.32	1.40	. .	. .	. .	Lieut. MacRae, observer.
10	65.07	61.28	3.79	. .	. .	. .	Do. do.
12	65.07	62.04	3.03	. .	. .	. .	Do. do.
13	63.67	62.24	1.43	. .	. .	. .	Lieut. MacRae, observer. Cusps badly defined and crescent very slender.
1851.							
Jan. 6	57.25	50.04	7.21	. .	. .	. .	All of these measures were made with an imperfect micrometer screw. It was so defective as to be regarded useless for the zone observations. They are not incorporated in the mean result.
7	57.81	49.24	8.57	. .	. .	. .	
8	53.62	48.48	5.14	. .	. .	. .	
9	54.46	47.84	6.62	. .	. .	. .	
11	52.50	46.24	6.26	. .	. .	. .	
12	47.75	45.44	2.31	. .	. .	. .	
13	52.22	44.64	7.58	. .	. .	. .	
14	52.78	43.84	+8.94	. .	. .	. .	
24	. .	. .	. .	37.93	37.39	0.54	Mean of ten measures at 13*h*. 15*m*., daylight.
26	. .	. .	. .	37.56	36.19	0.37	Mean of ten measures at 13*h*. 10*m*.
27	. .	. .	. .	35.88	35.60	0.28	Mean of ten measures at 13*h*. 15*m*.
28	. .	. .	. .	36.60	34.99	1.61	Mean of ten measures at 13*h*. 30*m*.
Feb. 5	. .	. .	. .	32.50	31.20	1.30	The observations generally good.
5	. .	. .	. .	31.93	31.18	+0.75	Mean of ten measures at 14*h*. 15*m*.

Date.	Mer. circle.	N. A.	C —N. A.	Equatorial.	N. A.	E —N. A.	Remarks.
1851.	″	″	″	″	″	″	
Feb. 6	. .	. .	. .	32.40	30.80	+1.60	Very fine morning; good steady images.
6	. .	. .	. .	31.01	30.78	0.23	Mean of ten measures at 14*h*. 32*m*.
7	. .	. .	. .	30.86	30.41	0.45	Very fine morning; clean, good images.
7	. .	. .	. .	31.43	30.38	1.05	Mean of ten measures at 14*h*. 30*m*.
10	. .	. .	. .	30.69	29.00	1.69	Observations generally good.
10	. .	. .	. .	29.49	28.98	0.51	Mean of ten measures at 14*h*. 49*m*.
Mean of 35 observations . .			+1.174	15 observations .		+1.046	

VERTICAL DIAMETERS OF VENUS, 1852.

Date.	Mer. Cir.	N. A.	C — N.A.	Equat'l.	N. A.	E — N.A.	Remarks.
1852.	"	"	"	"	"	"	
May 30	30.30	29.28	+1.02	26.77	29.33	—2.56	There never was a sharp image. At transit, tremulous.
31	32.12	29.68	2.44	. .	. .	. .	Seen through clouds.
June 2	31.00	30.48	0.52	32.84	30.53	+2.31	Unsteady and blurred. At transit, excessively unsteady.
3	33.79	30.88	2.91	30.36	30.93	—0.57	Sharp images. At transit, very fair observation.
12	37.14	35.68	1.46	38.64	35.73	+2.91	Star very dim.
13	37.28	36.08	1.20	. .	. .	. .	Very tremulous.
15	. .	. .	. .	38.49	37.60	0.89	Sharp images.
22	43.29	41.70	1.59	43.16	41.81	1.35	Measures not very satisfactory.
23	43.85	42.56	1.29	46.99	42.69	+4.30	Sharp clean images.
24	43.98	43.10	+0.88	42.65	43.21	—0.56	Good images.
28	43.29	45.96	—2.67	. .	. .	. .	Seen through cirri.
29	46.64	46.72	0.08	. .	. .	. .	Very unsteady.
30	47.20	47.36	0.16	. .	. .	. .	
July 1	47.89	48.12	0.23	. .	. .	. .	Seen through cirri.
5	49.15	50.92	1.77	. .	. .	. .	Quite unsteady.
6	50.55	51.52	0.97	. .	. .	. .	Fair observation.
7	50.83	52.12	1.29	. .	. .	. .	Quite unsteady.
8	51.11	52.72	—1.61	. .	. .	. .	Extremely unsteady.
9	53.48	53.28	+0.20	. .	. .	. .	Very unsteady and not satisfactory.
10	53.38	53.72	—0.34	55.53	53.83	+1.70	Mean of six measures at 12*h.* 54*m.* sid. time.
13	55.02	55.28	—0.26	. .	. .	. .	Southern cusp so indistinct that it is doubtful.
29	57.25	54.52	+2.73	. .	. .	. .	
30	55.15	54.08	1.07	60.31	54.20	6.11	Star badly defined.
31	55.85	53.52	2.33	56.89	53.60	3.29	Air full of moisture. At transit, very tremulous.
31	. .	. .	. .	56.33	53.60	+2.73	Mean of five measures at 3*h.* 17*m.* sid. time.
Aug. 4	52.36	51.28	1.08	49.68	51.40	—1.72	Unsteady and blurred. At transit, tolerably sharp and steady.
4	. .	. .	. .	54.65	51.40	+3.25	Mean of six measures at 3*h.* 23*m.* sid. time.
5	52.78	50.68	2.10	. .	. .	. .	Good observation.
6	51.94	50.08	1.86	. .	. .	. .	Through thin cirri, but quite sharp and steady. Cusps not quite clean.
7	52.50	49.48	3.02	. .	. .	. .	Rather tremulous.
8	51.66	48.84	2.82	45.35	49.00	—3.65	Very indifferent.
10	49.99	47.40	2.59	. .	. .	. .	
12	48.31	45.64	2.67	46.96	45.82	+1.14	Good measures. At transit, tremulous.
12	. .	. .	. .	47.91	45.80	2.11	Mean of six measures at 3*h.* 49*m.* sid. time.
13	50.41	44.84	5.57	46.54	44.97	1.57	Not very satisfactory. At transit, quite steady.
13	. .	. .	. .	48.43	44.97	3.46	Mean of six measures at 3*h.* 46*m.* sid. time.
14	46.22	44.08	2.14	. .	. .	. .	Cirri rendering cusps dim.
16	44.82	42.88	1.94	45.48	42.99	2.49	Cirri. Star dim. At transit cirri, tolerably steady.
16	. .	. .	. .	43.68	42.97	0.71	Mean of six measures at 3*h.* 53½*m.* sid. time.
21	42.87	39.68	3.19	41.62	39.79	+1.83	Fine observations. At transit, very tremulous.
21	. .	. .	. .	38.92	39.78	—0.86	Fine observations.
21	. .	. .	. .	41.63	39.77	+1.86	Mean of six measures at 4*h.* 14*m.* sid. time.
22	43.15	39.08	4.07	39.70	39.19	0.51	Very badly defined. At transit, excessively unsteady.
23	42.17	38.52	3.65	41.36	38.59	2.77	Very unfavorable morning. At transit, unsteady and clouds.
28	37.98	35.68	2.30	38.66	35.78	2.88	Images badly defined. At transit, same; tolerably steady.
31	36.58	33.92	2.66	. .	. .	. .	Bad image, but tolerably steady.
Sept. 1	36.86	33.48	3.38	36.05	33.58	2.47	Good observations. At transit, tolerably steady.
1	. .	. .	. .	34.21	33.59	0.62	Mean of six measures at 4*h.* 42*m.* sid. time.
2	35.75	32.96	2.79	36.38	33.00	3.38	Blurred. At transit, quite steady.
3	35.33	32.68	2.65	33.83	32.78	1.05	Unsteady and blurred. At transit, tolerably steady.
6	33.37	31.32	2.05	31.73	31.38	0.35	Generally satisfactory. At transit, quite steady and sharp.
7	33.23	30.92	2.31	33.03	30.99	2.04	Unsteady and badly defined. At transit, sharp, but unsteady.
8	32.67	30.52	2.15	31.82	30.58	+1.24	Unsteady. At transit, excessively unsteady.
13	29.60	28.52	+1.08	. .	. .	. .	Tolerably steady.
Mean of 45 observations .			+1.505	34 observations .		+1.512	

MARS AND VENUS.

U. S. NAVAL OBSERVATORY, WASHINGTON,

LIEUT. M. F. MAURY, LLD., SUPERINTENDENT.

MICROMETRICAL MEASURES

WITH THE

FOURTEEN FEET EQUATORIAL

DURING

THE OPPOSITIONS OF MARS AND INFERIOR CONJUNCTIONS OF VENUS IN THE YEARS 1849—1852.

LETTER FROM LIEUTENANT MAURY, U. S. N.

OBSERVATORY, WASHINGTON.

SIR: I have the pleasure to enclose you herewith the observations made at this establishment in connection with your Astronomical Expedition to Chile. They relate to Venus and Mars, and were made with the large equatorial by Mr. Ferguson. The accompanying letter from him to me, descriptive of the method of observing and reducing, contains, it is believed, all the explanations necessary.

I have not had the force to spare for copying these observations; I will, therefore, be obliged to you if, when you are done with them, you will return the originals to this office.

Respectfully, &c.,

M. F. MAURY.

Lieut. J. M. GILLISS,
Astronomer of Expedition to Chile, Washington.

UNITED STATES NAVAL OBSERVATORY,
May 1, 1855.

SIR: I herewith present journals of observations, and reductions of the same, of Mars and Venus, made in conformity with your instructions, and intended to be used in connection with observations of the same planets made in Chile under the direction of Lieutenant James M. Gilliss, for a more accurate determination of the parallax of the Sun. You will remember that early in December, 1849, after Mars had been observed several times and under different atmospherical circumstances, I stated to you that, from a discussion of the results of the comparisons already made, it was very evident that few of them would be available for the purpose intended, as at that season of the year the planet would but seldom be susceptible of sufficient definition to admit of the requisite accuracy of comparison. At the same time, I requested to know from you whether observations should be limited to such times as afforded reasonable hope of available results, or whether you wished me to observe without reference to circumstances. In answer, I was directed to observe whenever the planets were visible—this instruction applying equally to Venus and Mars. In consequence, observations have been made, and are now presented, which were not expected at the time to possess the requisite precision, and whose value can only be estimated by the character of the results derived from them.

The following description of the method of observing; the state of the instrument; its adjustment, and the value of the revolution of the micrometer, will supply all the information not given in the record of each observation.

The observations were made by myself, without any assistant; the circle of declination being clamped so as to bring the compared objects in the middle of the field, and the polar axis left altogether free; the position of the instrument being sufficiently assured by its weight.

The times were read from a chronometer placed near the observer. In the winter months the doors and windows were left open, and every precaution taken to equalize the internal and external temperatures. This condition could not often be perfectly obtained—it being impossible, in cold weather, to exclude entirely the heat from the lower part of the building. The external and internal temperatures are given at each observation; and, in addition to such remarks as were deemed essential to designate the state of the atmosphere, there is given opposite each series an abstract estimate of its quality, shown by the figures following the letter A; A 10 signifying the most perfect condition.

The chronometer used was compared with the standard clock of the Observatory immediately before the commencement of each series of comparison. A sidereal chronometer was used until October 12, 1850, and after that time a mean-time chronometer. In the reduction of the observations subsequent to October 12, 1850, the quantity Δt applied to the differences in right ascension expresses the correction necessary to reduce the mean to the sidereal interval.

The adjustment of the instrument was verified by observations of standard stars at proper intervals; the deviation of the polar axis in elevation, or in azimuth, never exceeding 30 seconds of arc. The state of the adjustment is sufficiently indicated by the micrometer readings to the same fixed star.

The value of a revolution of the micrometer used in the reductions is 15″.3717. It has been determined by transits of stars within 20° of the pole, and by measured distances between well determined stars of the Pleiades. The following table designates the character of the observations upon which the value adopted here depends:

Date.	Objects.	Temp.	Rev.	No. comp.	Part of scale.	A.
1849.		°	″			
Oct. 11	γ Cephei	. .	15.38570	18	10 to 70	10
Feb. 5	η Tauri 20 g. Maia . .	27	.37036	20	10 to 70	6
11	4 — 10 Pleiades . . .	42	.43579	10	37.6 to 55.7	7
12	Do	47	.41936	16	27.9 to 45.2	7
17	Do	40	.36391	10	26.7 to 45	10
22	16 g. 20 G Pleiad. . .	47	.35176	10	36 to 55	9
23	Do	43.5	.36641	25	36 to 55	9
25	Do	56.7	.36621	20	31 to 50	10
26	Do	60	.39244	12	28 to 57	10
Mar. 1	Do	56	.38025	8	23 to 43	7
4	Do	40	15.36749	14	42 to 61	8

For the final value (15.37168) the mean was taken, rejecting the observations of February 11 and 12. No attempt has been made to introduce a correction for temperature.

At the commencement of the observations, the micrometer contained three transit wires, and a declination wire upon one slide, and three declination wires upon the other; the latter slide being the one moved by the micrometer screw; the transit wires being designated by the letters A, B, C, and the central wire on the same slide by f. The three declination wires on the other slide are designated by the numbers 1, 2, 3; No. 1 being next to the micrometer screw-head. After December 18, 1851, five declination wires were introduced instead of three; numbered as in the first arrangement. The values of the intervals between the declination wires were as follows:

	Rev.
From November 1, 1849, till March 12, 1850	1 — 2 = 30.151
	2 — 3 = 29.913
	1 — 3 = 60.064
From October 1, 1850, till November 1, 1850	1 — 2 = 30.142
	2 — 3 = 29.947
	1 — 3 = 60.089

	Rev.
From November 1, 1850, till January 16, 1851 . . .	1 — 2 = 30.219
	2 — 3 = 29.870
	1 — 3 = 60.089
From January 16, 1851, till March 1, 1851	1 — 2 = 30.179
	2 — 3 = 29.936
	1 — 3 = 60.115

After December 18, 1851, the wires were unchanged, having the following intervals:

Rev.
1 — 5 = 60.149
1 — 4 = 42.997
1 — 3 = 30.091
1 — 2 = 17.113

In observing, the inner side of the wire was brought into contact with the limb of the planet, so that the measured diameters are too great by the thickness of the wire. This thickness may be taken for all the wires at 0″.432; a value determined by the interval between the centres of two wires brought to touch each other, using the highest magnifying power of the telescope.

At the commencement of the observations of Mars in 1849, the declination wires were brought into contact with both limbs of the planet at each comparison; and that a similar result might be obtained from the transits, the preceding limb was observed on A and C, and the following on B. This practice was discontinued in the subsequent observations.

The power of the eye-piece used, unless where otherwise noted, was 120.

The headings of the different columns in the record of observations sufficiently explain their contents. In reducing the observations, the mean differences of right ascension and declination have been taken as the true differences of these quantities at the mean of the chronometer times. For this epoch, the correction to the chronometer and the correction for differential refraction ($\Delta \varrho$) have been given. In the final discussion of the observations, it will doubtless be necessary to select from the comparisons, and consequently to adopt other means than those used in this preliminary reduction. The corrections to the observations of Venus, necessary on account of defective illumination, have not been computed.

Very respectfully, your obedient servant,

J. FERGUSON.

Matthew F. Maury, LL. D.,

Lieut. U. S. N., and Superintendent of the Naval Observatory.

OPPOSITIONS OF MARS, 1849-52.

MICROMETRICAL OBSERVATIONS,

WITH

THE 14 FEET EQUATORIAL,

AT

THE NAVAL OBSERVATORY, WASHINGTON.

OPPOSITION OF MARS, 1849–50.

NAVAL OBSERVATORY, WASHINGTON.

NOVEMBER 2, 1849.												
No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Mars—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	B. Z. . . . 348.84	38.1	51.3	4.8	4 1 51.40	2 33.730	+7 2.93 4.76	—0.052	30.092	50.2	50.2	43.6
2	* 9.10	5.7	19.2	. .	. . . .	2 31.671						
3	* 9	49.0	. .	. .	. . . .	2 32.713						
4	Mars . . . S.P. .	41.0	54.0	8.0	4 8 54.33	2 33.782						
5	Mars . . . F. . .	43.0	56.0	9.5	4 8 56.16							
6	B. Z. . . . 348.84	35.0	48.5	1.5	4 18 48.33	2 33.769	7 3.50 5.25	+1.353				
7	* 9.10	3.2	16.5	. .	. . . .	2 31.760						
8	* 9	47.3	. .	13.5	. . . .	2 32.567						
9	Mars . . . N.P. .	. .	52.0	5.0	4 25 51.83	2 32.416						
10	Mars . . F. . .	. .	53.5	7.0	4 25 53.58							
11	B. Z. . . . 348.79	4.7	18.3	31.5	4 33 18.17	2 25.652						
12	B. Z. . . . 348.84	3.2	. .	31.0	4 36 17.10	2 33.919	7 3.90 5.80	0.281				
13	* 9.10	. .	45.0	58.0	. . . .	2 31.608						
14	* 9	. .	28.0	. .	. . . .	2 32.527						
15	Mars . . . S.P. .	7.0	21.0	35.0	4 43 21.00	2 33.638						
16	Mars . . . F. . .	9.2	23.0	36.5	4 43 22.90							
17	B. Z. . . . 348.84	54.2	8.1	21.0	5 3 7.79	2 33.761	7 3.88 5.94	+1.692				
18	* 9.10	21.8	35.4	49.1	. . . .	2 31.551						
19	* 9	6.0	19.2	. .	. . . .	2 32.541						
20	Mars . . . N.P. .	58.0	12.0	25.0	5 10 11.67	2 32.069						
21	Mars . . . F. . .	1.1	13.1	27.0	5 10 13.73							
22	B. Z. . . . 348.84	30.2	43.1	57.0	5 29 43.43	2 33.858	7 4.00 5.77	—0.131				
23	* 9.10	58.3	11.0	24.8	. . . .	2 31.599						
24	* 9	40.8	54.7	. .	. . . .	2 32.502						
25	Mars . . . S.P. .	34.0	47.3	1.0	5 36 47.43	2 33.989						
26	Mars . . . F. . .	36.2	49.1	2.3	5 36 49.20							
27	B. Z. . . . 348.84	53.7	. .	20.5	5 47 7.10	2 29.272	7 4.83 6.20	+1.997				
28	* 9.10	22.1	. .	48.0	. . . .	2 27.245						
29	* 9	5.6	19.2	. .	. . . .	2 28.170						
30	Mars . . . N.P. .	58.0	12.1	25.7	5 54 11.93	2 27.275						
31	Mars . . . F. . .	0.2	13.5	26.2	5 54 13.30							
32	B. Z. . . . 348.84	15.6	29.2	42.3	6 2 29.03	2 29.279	+ 7 4.75 6.85	+0.821				
33	* 9.10	44.1	56.7	10.1	. . . .	2 27.056						
34	* 9	27.1	41.0	54.0	. . . .	2 27.849						
35	Mars . . . S.P. .	. .	34.0	47.0	6 9 33.78	2 28.458						
36	Mars . . . F. . .	. .	36.2	49.0	6 9 35.88							

Remarks.

The night misty. Planet blurred and indistinct.

NOVEMBER 2, 1849—Continued.

Results.

		Mean of chronometer times.		Mars centre — * Δ α.	Δ δ.
		h. m. s.		m. s.	
Mars —B. Z. 348.84 . .	Seven comparisons . . .	5 9 51.19	. . . .	+7 6.31	. . .
	Correction of chronometer .	+43.81	Δ ρ	0.00	. . .
		h. m. s.			Rev.
Mars —B. Z. 348.84 . .	Six comparisons	5 20 0.52	. . . .		+ 1.002
	Correction of chronometer .	+43.82	. . . .		+15″.41
			Δ ρ		0″.00

NOVEMBER 4, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	* 9	49.5	3.0	16.5	. . . .	2 42.558			30.176	60.0	54.3	59.0
2	* 9	. .	49.0	3.0	. . . .	2 46.082						
3	Mars . . . P. . .	. .	34.2	47.0	3 44 33.85							
4	Mars . . . S.F. .	. .	35.2	48.2	3 44 35.05	2 42.100						
5	B. Z. . . . 348.94	. .	31.0	. .	. . . .	1 43.848						
6	B. Z. . . . 348.95	. .	. .	17.0	3 46 3.85	1 50.492	—1 28.80 30.00	—21.759				
7	* 9	. .	. .	3.5	. . . .	2 48.086						
8	* 9	42.5	56.2	9.5	. . . .	2 42.581						
9	* 9	. .	. .	56.2	. . . .	2 46.179						
10	Mars . . . P. . .	. .	. .	40.0	3 56 26.55							
11	Mars . . . N.F. .	. .	. .	42.5	3 56 28.05	2 40.690						
12	B. Z. . . . 348.94	. .	. .	37.5	. . . .	1 43.431						
13	B. Z. . . . 348.95	. .	. .	10.5	3 57 57.05	1 50.544	1 29.00 30.50	20.297				
14	* 9	42.3	56.1	9.5	. . . .	2 42.528						
15	* 9	29.1	42.5	56.5	. . . .	2 46.066						
16	Mars . . . S.P. .	12.3	26.0	40.0	4 7 26.10	2 42.068						
17	Mars . . . N.F. .	. .	28.2	41.8	4 7 28.10	2 40.562						
18	B. Z. . . . 348.94	10.1	24.3	37.7	. . . .	1 43.730						
19	B. Z. . . . 348.95	. .	55.5	9.5	4 8 55.60	1 50.411	1 27.50 29.50	21.808 20.302				
20	* 9	55.2	9.2	22.2	. . . .	2 42.600						
21	* 9	42.1	56.0	9.2	. . . .	2 46.235						
22	Mars . . . S.P. .	26.0	39.7	53.2	4 18 39.63	2 42.092						
23	Mars . . . N.F. .	27.9	41.5	54.7	4 18 41.37	2 40.551						
24	B. Z. . . . 348.94	23.2	37.0	51.2	. . . .	1 45.725						
25	B. Z. . . . 348.95	. .	8.5	22.1	4 20 8.55	1 50.498	1 27.18 28.92	21.745 20.204				
26	* 9	27.2	41.2	54.5	. . . .	2 46.021						
27	Mars . . . S P. .	11.0	25.2	38.2	4 36 24.80	2 41.777						
28	Mars . . . N.F. .	12.3	27.0	39.7	4 36 26.33	2 40.253						
29	B. Z. . . . 348.94	8.2	22.0	35.6	. . . .	1 43.612						
80	B. Z. . . . 348.95	. .	54.2	7.6	4 37 54.03	1 50.219	1 27.70 29.28	21.709 20.185				
31	* 9	2.5	16.0	30.0	. . . .	2 46.038						
32	Mars . . . S.P. .	46.2	1.0	13.2	4 43 59.70	2 41.760						
33	Mars . . . N.F. .	48.1	3.5	15.1	4 44 1.60	2 40.350						
34	B. Z. . . . 348.94	43.2	57.6	10.5	. . . .	1 43.701						
35	B. Z. . . . 348.95	. .	29.2	42.7	4 45 29.00	1 50.252	1 27.40 29.30	21.659 20.249				
36	* 9	35.2	48.5	2.5	. . . .	2 45.965						
37	Mars . . . S.P. .	19.2	34.2	46.2	4 53 32.70	2 41.490						
38	Mars . . . N.F. .	. .	. .	. .	. . . .	2 40.208						
39	B. Z. . . . 348.94	16.2	29.5	43.2	. . . .	1 43.551						
40	B. Z. . . . 348.95	. .	1.5	15.0	4 55 1.53	1 50.290	—1 28.83	—21.351 20.069				

NOVEMBER 4, 1849—Continued.

No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Mars—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
41	* 9	12.5	26.0	39.5	. . . .	2 45.931			30.176	60.0	54.3	59.0
42	Mars . . . S.P. .	57.1	11.3	23.5	5 3 10.30	2 41.290						
43	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.105						
44	B. Z. . . . 348.94	54.2	7.2	20.5	. . . .	1 43.460		—21.175				
45	B. Z. . . . 348.95	. .	39.2	52.3	5 4 39.20	1 50.266	—1 28.90	19.991				
46	* 9	45.5	58.5	12.0	. . . .	2 46.122						
47	Mars . . . S.P. .	29.5	44.2	57.2	5 15 43.35	2 41.550						
48	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.263						
49	B. Z. . . . 348.94	27.1	40.3	54.1	. . . .	1 43.680		21.260				
50	B. Z. . . . 348.95	. .	12.3	25.7	5 17 12.30	1 50.441	1 28.95	19.973				
51	* 9	2.5	16.1	29.3	. . . .	2 46.220						
52	Mars . . . S.P. .	47.2	1.9	14.0	5 25 0.60	2 41.300						
53	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.209						
54	B. Z. . . . 348.94	. .	. .	1.5	. . . .	1 43.886		20.979				
55	B. Z. . . . 348.95	. .	29.5	43.1	5 25 29.63	1 50.472	1 29.03	19.888				
56	* 9	6.2	19.5	33.7	. . . .	2 46.370						
57	Mars . . . S.P. .	51.0	5.3	17.3	5 34 4.15	2 41.608						
58	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.479						
59	B. Z. . . . 348.94	47.2	1.3	14.3	. . . .	1 44.015		21.031				
60	B. Z. . . . 348 95	. .	32.5	46.2	5 35 32.48	1 50.728	1 28.33	19.902				
61	* 9	8.5	21.5	35.1	. . . .	2 46.361						
62	Mars . . . S.P. .	53.1	7.2	19.2	5 41 6.15	2 41.484						
63	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.232						
64	B. Z. . . . 348.94	49.2	3.5	16.0	. . . .	1 43.941		20.973				
65	B. Z. . . . 348.95	. .	35.2	48.0	5 42 34.75	1 50.662	1 28.60	19.721				
66	* 9	30.5	43.0	56.2	. . . .	2 46.360						
67	Mars . . . S.P. .	14.2	29.2	41.6	5 52 27.90	2 41.343						
68	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.129						
69	B. Z. . . . 348.94	10.3	23.5	. .	. . . .	1 44.108		20.812				
70	B. Z. . . . 348.95	42.5	. .	9.2	5 53 55.85	1 50.682	—1 27.95	—19.598				

Remarks.

Night misty; at conclusion, stars not seen. After this comparison, the transit of the preceding limb is observed on A. C., and the following limb on B., unless where it is otherwise noted. A 5.

Results.

		Mean of chronometer times.		Mars — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Mars —B. Z. 348.95	Six comparisons	4 14 35.10	. . . .	— 1 28.75	— 20.992
	Correction of chronometer .	+ 49.40	. . . .		— 5′ 22″.68
			Δ ρ . . .	0.00	— 0″.10
		h. m. s.		m. s.	Rev.
Mars P. and centre —B. Z. 348.95 .	Seven comparisons . . .	5 23 35.02	. . . .	— 1 28.66	— 20.480
	Correction of chronometer .	+ 49.46	. . . .		— 5′ 14″.81
			Δ ρ		— 0″.09

NOVEMBER 6, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	22.1	36.1	50.3	3 59 36.17	2 36.177			30.028	72.0	65.0	61.0
2	Mars . . . N.F. .	24.3	38.3	51.3	3 59 38.03	2 34.682		—1.192				
3	B. Z. . . . 348.95	30.8	44.0	58.1	4 0 44.30	2 34.985	—1 8.13	+0.303				
4	Mars . . . S.P. .	7.1	22.1	33.9	4 5 20.50	2 36.220						
5	Mars . . . N. . .	. .	. .	. .	. . . .	2 34.591		—1.401				
6	B. Z. . . . 348.95	. .	29.7	42.0	4 6 28.10	2 34.819	1 7.60	+0.228				
7	Mars . . . S.P. .	59.7	15.1	26.7	4 11 13.20	2 35.919						
8	Mars . . . N. . .	. .	. .	. .	. . . .	2 34.680		—1.068				
9	B. Z. . . . 348.95	7.3	20.8	34.3	4 12 20.80	2 34.851	1 7.60	+0.171				
10	Mars . . . S.P. .	49.2	4.1	16.0	4 16 2.60	2 36.228						
11	Mars . . . N. . .	. .	. .	. .	. . . .	2 34.697		—1.388				
12	B. Z. . . . 348.95	57.3	10.8	24.1	4 17 10.73	2 34.840	1 8.13	+0.143				
13	Mars . . . S.P. .	56.0	10.8	23.2	4 20 9.60	2 36.167						
14	Mars . . . N. . .	. .	. .	. .	. . . .	2 34.590		—1.288				
15	B. Z. . . . 348.95	3.8	. .	30.9	4 21 17.35	2 34.879	1 7.75	+0.289				
16	Mars . . . S.P. .	54.2	9.5	21.3	4 25 7.75	2 35.947						
17	Mars . . . N. . .	. .	. .	. .	. . . .	2 34.552		—1.178				
18	B. Z. . . . 348.95	2.3	16.0	29.5	4 26 15.93	2 34.769	1 8.18	+0.217				
19	Mars . . . S.P. .	11.2	26.6	38.7	4 29 21.95	2 35.756						
20	Mars . . . N. . .	. .	. .	. .	. . . .	2 34.395		—0.747				
21	B. Z. . . . 348.95	19.4	33.2	46.6	4 30 33.07	2 35.009	1 8.12	+0.614				
22	Mars . . . S.P. .	27.9	43.0	54.9	4 33 41.40	2 35.831						
23	Mars . . . N. . .	. .	. .	. .	. . . .	2 34.462		—0.771				
24	B. Z. . . . 348.95	36.0	49.1	3.0	4 34 49.37	2 35.060	—1 7.97	+0.598				

Remarks.

Observations interrupted by thick fog. A 6.

Results.

		Mean of chronometer times. h. m. s.		Mars — * Δ α. m. s.	Δ δ. Rev.
Mars P. and centre —B. Z. 348.95 .	Eight comparisons	4 17 34.45	. . . .	—1 7.93	— 0.809
	Correction of chronometer .	+54.47	. . . .		— 12″.43
			Δ ρ	0.00	0″.00

NOVEMBER 10, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	36.9	51.3	3.5	3 42 50.20	2 37.921			29.950	73.0		48.0
2	Mars . . . N. . .	. .	. .	. .	. . . .	2 36.382		—0.924				
3	B. A. C. . . 2154 .	5.1	18.2	31.8	3 44 18.37	2 35.458	—1 28.17	—2.563				
4	Mars . . . S.P. .	41.8	56.7	9.1	3 48 55.45	2 37.609						
5	Mars . . . N. . .	. .	. .	. .	. . . .	2 36.390						
6	B. A. C. . . 2154 .	10.1	23.5	. .	3 50 23.50	(Star lost.)	—1 28.15					

NOVEMBER 10, 1849—Continued.

Remarks.

Observations interrupted by clouds continuing all night. A 6.

NOVEMBER 12, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Lalande . . 12557 .	56.1	9.2	23.5	3 55 9.60	2 46.710	+32.95	+12.683	30.094	74.0	47.0	44.0
2	Mars . . . S.P. .	29.1	44.1	56.0	3 55 42.55	2 34.027		14.462				
3	Mars . . . N. . .	. .	. .	. .	. . . .	2 32.248						
4	Lalande . . 12557 .	3.4	17.2	30.3	4 0 16.97	2 46.611	32.73	12.642				
5	Mars . . . S.P. .	36.2	51.5	3.2	4 0 49.70	2 33.969		14.530				
6	Mars . . . N. .	. .	. .	. .	. . . .	2 32.081						
7	Lalande . . 12557 .	15.3	29.1	42.4	4 4 28.93	2 46.609	32.82	12.702				
8	Mars . . . S.P. .	48.2	4.0	15.3	4 5 1.75	2 33.907		14.558				
9	Mars . . . N. . .	. .	. .	. .	. . . .	2 32.051						
10	Lalande . . 12557 .	31.3	44.5	58.3	4 9 44.70	2 46.478	32.80	12.647				
11	Mars . . . S.P. .	4.0	19.1	31.0	4 10 17.50	2 33.831		14.568				
12	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.910						
13	Lalande . . 12557 .	9.3	23.0	36.1	4 13 22.80	2 46.518	32.95	12.833				
14	Mars . . . S.P. .	42.1	57.5	9.4	4 13 55.75	2 33.685		14.678				
15	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.840						
16	Lalande . . 12557 .	17.3	30.7	44.3	4 18 30.77	2 46.540	32.63	12.819				
17	Mars . . . S.P. .	49.7	5.1	17.1	4 19 3.40	2 33.721		14.652				
18	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.888						
19	Lalande . . 12557 .	54.3	7.7	21.3	4 22 7.77	2 46.393	32.63	12.763				
20	Mars . . . S.P. .	26.9	42.5	53.9	4 22 40.40	2 33.630		14.541				
21	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.852						
22	Lalande . . 12557 .	26.3	40.5	53.3	4 28 40.03	2 46.578	32.42	12.887				
23	Mars . . . S.P. .	59.0	14.2	25.9	4 29 12.45	2 33.691		14.817				
24	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.761						
25	Lalande . . 12557 .	38.1	50.8	4.4	4 32 51.10	2 46.503	33.05	12.950				
26	Mars . . . S.P. .	. .	26.1	37.5	4 32 24.15	2 33.553		14.746				
27	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.757						
28	Lalande . . 12557 .	15.3	29.2	43.1	4 37 29.20	2 46.537	32.35	13.047				
29	Mars . . . S.P. .	47.9	3.4	15.2	4 38 1.55	2 33.490		14.968				
30	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.569						
31	Lalande . . 12557 .	27.2	40.7	54.3	4 42 40.73	2 46.321	32.12	13.018				
32	Mars . . . S.P. .	59.0	15.0	26.7	4 43 12.85	2 33.303		14.849				
33	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.472						
34	Lalande . . 12557 .	8.8	23.1	36.2	4 48 22.70	2 46.291	32.35	13.078				
35	Mars . . . S.P. .	41.0	57.3	9.1	4 48 55.05	2 33.213		14.973				
36	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.318						
37	Lalande . . 12557 .	53.1	9.4	23.1	4 52 9.20	2 46.358	32.25	13.335				
38	Mars . . . S.P. .	27.8	43.2	55.1	4 52 41.45	2 33.023		15.018				
39	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.340						
40	Lalande . . 12557 .	28.1	41.3	54.5	4 55 41.30	2 46.340	31.85	13.380				
41	Mars . . . S.P. .	. .	15.1	26.9	4 56 13.15	2 32.960		15.025				
42	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.315						
43	Lalande . . 12557 .	24.2	38.3	51.4	5 0 37.77	2 46.116	+32.62	13.102				
44	Mars . . . S.P. .	56.8	11.9	24.0	5 1 10.40	2 23.014		+14.890				
45	Mars . . . N. . .	. .	. .	. .	. . . .	2 31.226						

NOVEMBER 12, 1849—Continued.

No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Mars—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
46	Lalande . . 12557 .	45.3	59.1	12.5	5 10 58.97	2 45.426	+31.83	+13.286	30.094	74.0	47.0	44.0
47	Mars . . . S.P. .	17.1	33.0	44.5	5 11 30.80	2 32.140		15.154				
48	Mars . . . N. . . .	. .	. .	. .	. . . . .	2 30.272						
49	Lalande . . 12557 .	39.1	52.0	5.1	5 15 52.07	2 45.571	31.92	13.462				
50	Mars . . . S.P. .	. .	25.5	37.8	5 16 23.99	2 32.109		15.179				
51	Mars . . . N. . .	. .	. .	. .	. . . . .	2 30.392						
52	Lalande . . 12557 .	36.2	50.3	3.1	5 24 49.87	2 45.395	31.73	13.340				
53	Mars . . . S.P. .	8.0	23.1	35.2	5 25 21.60	2 32.055		15.082				
54	Mars . . . N. . .	. .	. .	. .	. . . . .	2 30.313						
55	Lalande . . 12557 .	59.4	13.2	26.1	5 32 12.90	2 45.270	31.45	13.408				
56	Mars . . . S.P. .	30.7	46.2	58.0	5 32 44.35	2 31.862		15.039				
57	Mars . . . N. . .	. .	. .	. .	. . . . .	2 30.231						
58	Lalande . . 12557 .	6.1	20.0	33.3	5 38 19.80	2 46.407	31.89	13.656				
59	Mars . . . S.P. .	. .	51.0	5.0	5 38 49.05	2 32.751		15.092				
60	Mars . . . N.F. .	. .	53.2	6.2	5 38 51.69	2 31.315						
61	Lalande . . 12557 .	58.2	11.4	25.1	5 57 11.57	2 45.608	30.58	13.656				
62	Mars . . . S.P. .	. .	44.1	56.2	5 57 42.15	2 31.952		15.508				
63	Mars . . . N. . .	. .	. .	. .	. . . . .	2 30.100						
64	Lalande . . 12557 .	3.3	16.2	29.1	6 1 16.20	2 45.692	30.95	13.760				
65	Mars . . . S.P. .	. .	49.1	0.8	6 1 47.15	2 31.932		15.514				
66	Mars . . . N. . .	. .	. .	. .	. . . . .	2 30.178						
67	Lalande . . 12557 .	40.0	53.3	7.0	6 7 53.43	2 45.652	31.42	13.765				
68	Mars . . . S.P. .	11.0	27.0	38.7	6 8 24.85	2 31.887		15.461				
69	Mars . . . N. . .	. .	. .	. .	. . . . .	2 30.191						
70	Lalande . . 12557 .	39.1	52.7	6.0	6 15 52.60	2 45.731	31.30	13.961				
71	Mars . . . S.P. .	11.0	25.6	36.8	6 16 23.90	2 31.770		15.679				
72	Mars . . . N. . .	. .	. .	. .	. . . . .	2 30.052						
73	Lalande . . 12557 .	10.1	23.5	. .	6 42 23.44	2 46.389	+31.41	14.348				
74	Mars . . . S.P. .	41.2	56.5	0.8	6 42 54.85	2 32.041		+15.769				
75	Mars . . . N. . .	. .	. .	. .	. . . . .	2 30.620						

Remarks.

The position of the observer at the last comparison was so confined and cramped as to render the observations altogether unsatisfactory.

Night very fine. Low mist, and very heavy dew. A 10.

Results.

		Mean of chronometer times.		Mars — ⁎ Δ α.	Mars — ⁎ Δ δ.
		h. m. s.		s.	Rev.
Mars P. and centre —Lalande 12557 .	Nineteen comparisons . .	4 39 45.41	. . . . . .	+ 32.39	+ 13.924
	Correction of chronometer .	+ 1 5.12	. . . .		+ 3′ 34″.03
			Δ ρ . . .	0.00	+ 0″.06
		h. m. s.		s.	Rev.
Mars P. and centre —Lalande 12557 .	Six comparisons	6 7 40.32	. . . . . .	+ 31.26	+ 14.681
	Correction of chronometer .	+ 1 5.24	. . . .		+ 3′ 45″.67
			Δ ρ . . .	0.00	+ 0″.06

NOVEMBER 13, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Lalande . . 12557 .	39.3	53.1	6.0	3 14 52.80	3 33.752	+16.70	+24.532	30.012	60.0		55.5
2	Mars . . . S.P. .	56.0	11.2	23.0	3 15 9.50	2 39.133		25.956				
3	Mars . . . N. . .	. .	. .	. .	. . . .	2 37.709						
4	Lalande . . 12557 .	18.1	31.0	45.0	3 19 31.37	3 33.565	16.73	24.449				
5	Mars . . . S.P. .	35.0	49.0	1.2	3 19 48.10	2 39.029		25.863				
6	Mars . . . N. . .	. .	. .	. .	. . . .	2 37.615						
7	Lalande . . 12557 .	53.0	5.1	. .	3 23 5.10	3 33.620	16.10	24.574				
8	Mars . . . S.P. .	8.3	23.0	34.1	3 23 21.20	2 38.959		25.918				
9	Mars . . . N. . .	. .	. .	. .	. . . .	2 37.615						
10	Lalande . . 12557 .	24.0	38.0	51.7	3 29 37.90	3 36.782	16.00	24.604				
11	Mars . . . S.P. .	40.0	56.0	7.8	3 29 53.90	2 42.091		26.009				
12	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.686						
13	Lalande . . 12557 .	14.9	28.5	42.0	3 32 28.47	3 36.788	15.98	24.490				
14	Mars . . . S.P. .	31.2	46.0	57.7	3 32 44.45	2 42.211		25.991				
15	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.710						
16	Lalande . . 12557 .	33.0	46.5	0.5	3 36 46.67	3 36.802	15.98	24.565				
17	Mars . . . S.P. .	49.1	. .	16.2	3 37 2.65	2 42.150		25.989				
18	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.726						
19	Lalande . . 12557 .	4.2	17.7	31.0	3 40 17.63	3 36.875	16.10	24.799				
20	Mars . . . S.P. .	. .	35.2	47.1	3 40 33.73	2 41.989		26.276				
21	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.512						
22	Lalande . . 12557 .	58.5	12.0	25.2	3 43 11.90	3 36.862	16.45	24.625				
23	Mars . . . S.P. .	15.0	29.7	41.7	3 43 28.35	2 42.150		26.079				
24	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.696						
25 a	Lalande . . 12557 .	19.7	33.1	47.0	3 45 33.27	3 36.902	15.68					
26	Mars . . . S.P. .	35.0	51.0	2.9	3 45 48.95	Lost.						
27	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.387						
28	Lalande . . 12557 .	35.2	49.1	2.3	3 50 48.87	3 36.802	15.63	24.645				
29	Mars . . . S.P. .	51.0	6.5	18.0	3 51 4.50	2 42.070		26.370				
30	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.345						
31 a	Lalande . . 12557 .	45.1	58.5	10.3	3 59 57.97	3 36.928						
32	Mars . . . S.P. .	3.1	. .	28.2	4 0 15.65	2 41.905						
33	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.486						
34	Lalande . . 12557 .	24.3	37.5	51.0	4 7 37.60	3 36.826	15.90	24.970				
35	Mars . . . S.P. .	. .	55.1	6.9	4 7 53.50	2 41.769		26.343				
36	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.396						
37	Lalande . . 12557 .	14.2	28.0	41.0	4 11 27.73	3 36.925	15.87	25.099				
38	Mars . . . S.P. .	30.2	45.3	57.0	4 11 43.60	2 41.739		26.562				
39	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.276						
40	Lalande . . 12557 .	47.3	1.0	14.3	4 18 0.87	3 36.975	15.33	25.127				
41	Mars . . . S.P. .	3.2	18.1	29.2	4 18 16.20	2 41.761		26.402				
42	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.486						
43 a	Lalande . . 12557 .	55.1	8.5	21.7	4 21 8.43	3 37.075	15.07					
44	Mars . . . S.P. .	10.0	. .	37.0	4 21 23.50	Lost.						
45	Mars . . . N. . .	. .	. .	. .	. . . .	3 40.401						
46	Lalande . . 12557 .	39.2	52.1	6.0	4 42 52.37	3 37.011	15.38	25.346				
47	Mars . . . S.P. .	54.0	9.3	21.5	4 43 7.75	2 41.578		26.649				
48	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.275						
49	Lalande . . 12557 .	31.3	45.0	58.1	4 47 44.80	3 36.950	+14.80	25.425				
50	Mars . . . S.P. .	46.2	1.9	13.0	4 47 59.60	2 41.438		+26.657				

NOVEMBER 13, 1849—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
51	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.206			30.012	60.0		55.5
52	Lalande . . 12557 .	28.1	41.0	55.0	4 52 41.37	3 36.895	+15.13	+25.261				
53	Mars . . . S.P. .	43.0	58.2	10.0	4 52 56.50	2 41.547		26.575				
54	Mars . . . N. . .	. .	. .	. .	. . . .	2 40.233						

Remarks.

Very fine night. A 10.
a Omitted in means.

Results.

		Mean of chronometer times.	Mars — * Δ α.	Δ δ.
		h. m. s.	s.	Rev.
Mars P. and centre —Lalande 12557 .	Fifteen comparisons . . .	3 55 40.23	. . . . + 15.87	+ 25.538
	Correction of chronometer .	+ 1 6.96	. . . .	+ 6′ 32″.56
			Δ ρ . . . 0.00	+ 0″.12

NOVEMBER 20, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	B. Z. . . . 523.110	. .	18.2	. .	3 46 18.2	2 38.258	+1 10.8	+0.097	29.78	57.8		58.4
2	Mars . . . N.P. .	. .	29.0	. .	3 47 29.0	2 38.161	12.1					
3	Mars . . . F. . .	. .	30.3	. .	3 47 30.3	. . .						
4	B. Z. . . . 523.110	.	41.8	. .	3 50 41.8	2 38.297	+1 10.2	+0.148				
5	Mars . . . N.P. .	. .	52.0	. .	3 51 52.0	2 38.149	11.8					
6	Mars . . . F. . .	. .	53.6	. .	3 51 53.6	. . .						

Remarks.

Wind too high, and soon overclouded. A 7.

NOVEMBER 24, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	B. Z. . . . 523.106	25.1	39.1	. .	3 48 39.00	2 42.070	+ 39.10	+1.891	30.054	70.0		54.0
2	Mars . . . S.P. .	4.0	. .	32.2	3 49 18.10	2 40.179						
3	* 9	27.0	40.8	55.0	3 50 40.93	2 53.543						
4	B. Z. . . . 523.106	43.1	57.0	. .	3 54 56.90	2 42.019	+ 39.00	+2.920				
5	Mars . . . P. . .	. .	36.0	49.0	3 55 35.90	. . .						
6	Mars . . . N.F. .	. .	37.5	51.0	3 55 37.40	2 39.099						
7	* 9	45.2	59.2	12.7	3 56 59.03	2 53.511						

NOVEMBER 24, 1849—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δα	Δδ	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
8	B. Z. . . . 523.106	0.7	14.1	. .	4 1 14.00	2 42.100	+ 39.60	+1.918	30.054	70.0		54.0
9	Mars . . . S.P. .	40.0	55.1	7.2	4 1 53.60	2 40.182						
10	* 9	2.0	16.0	30.0	4 3 16.00	2 53.775						
11	B. Z. . . . 523.106	47.5	1.0	. .	4 8 0.90	2 42.205	39.00	1.983				
12	Mars . . . P. . .	. .	40.0	54.0	4 8 39.90	. . .						
13	Mars . . . S.F. .	. .	41.5	55.5	4 8 41.40	2 40.222						
14		50.3	3.8	17.0	4 10 3.70	2 53.759						
15 a	B. Z. . . . 523.106	15.2	29.0	. .	4 12 28.90	2 42.222	. . .	3.352				
16	Mars . . . P. . .	. .	7.0	21.0	4 13 6.90	. . .						
17	Mars . . . N.F. .	. .	9.2	23.0	4 13 9.10	2 38.870						
18	* 9	18.2	31.0	44.7	4 14 31.30	2 53.772						
19 a	B. Z. . . . 523.106	33.2	45.8	. .	4 19 45.70	2 42.251	. . .	1.990				
20	Mars . . . P. . .	. .	24.0	38.0	4 20 23.90	. . .						
21	Mars . . . S.F. .	. .	26.2	39.2	4 20 26.10	2 40.261						
22	* 9	34.2	49.1	2.3	4 21 48.53	2 53.741						
23	B. Z. . . . 523.106	35.1	48.0	. .	4 23 47.90	2 42.114	38.75	3.343				
24	Mars . . . N.P. .	13.0	28.0	40.3	4 24 26.65	2 38.771						
25	* 9	36.8	51.3	4.0	4 25 50.70	(Lost.)						
26	B. Z. . . . 523.106	56.1	10.2	. .	4 48 10.10	2 42.225	36.80	3.745				
27	Mars . . . N.P. .	33.0	49.1	0.8	4 48 46.90	2 38.480						
28	* 9	59.3	13.1	26.2	4 50 12.87	(Lost.)						
29	B. Z. . . . 523.106	15.1	29.1	. .	4 55 29.00	2 42.220	+ 36.30	3.676				
30	Mars . . . N.P. .	51.4	6.5	19.2	4 57 5.30	2 38.544						
31	* 9	18.2	31.1	44.8	4 58 31.37	2 53.663						
32	* 9	. .	. .	14.0	4 59 0.65	1 56.537						
33	B. Z. . . . 523.111	. .	6.2	. .	4 59 6.10	1 57.173	—2 0.80					
34	B. Z. . . . 523.106	45.1	58.4	12.0	5 32 58.50	2 43.740	+ 34.55	+2.739				
35	Mars . . . S.P. .	19.2	34.3	46.9	5 33 33.05	2 41.001						
36	* 9	48.3	. .	15.1	5 35 1.70	2 55.372						
37	* 9	. .	30.4	44.7	5 35 30.30	1 58.131						
38	B. Z. . . . 523.111	22.3	36.0	49.1	5 35 35.80	1 58.910	—2 2.75					

Remarks.

Clouds interrupted further observations. The star B. Z. 523.106 was used in these comparisons, instead of B. Z. 523.111, it being most distinctly seen. The other star (111) was intended to be used in continuing the observations, had the weather permitted. A 8.

a Omitted in mean.

Results.

		Mean of chronometer times.	Mars — * Δα.	Δδ.
		h. m. s.	s.	
Mars P —B. Z. 523.106 . .	Eight comparisons	4 27 24.92	. . . . . + 37.89	. . . .
	Correction of chronometer . . .	+ 1 27.40	Δρ . . 0.00	. . . .
		h. m. s.		Rev.
Mars S —B. Z. 523.106 . .	Five comparisons	4 22 45.71	. . . .	+ 2.104
	Correction of chronometer . . .	+ 1 27.40	. . . .	+ 32″.34
			Δρ	0″.00
		h. m. s.		Rev.
Mars N —B. Z. 523.106 . .	Five comparisons	4 27 48.33	. . . .	+ 3.407
	Correction of chronometer . . .	+ 1 27.40	. . . .	+ 52″.37
		. . . . .	Δρ	0″.00

NOVEMBER 26, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P.	17.2	32.1	44.0	3 34 30.60	2 37.001						49.5
2	Mars . . . N. .	. .	. .	. .	. . . . .	2 35.379		—3.310				
3	Lalande . . 12237 .	34.0	48.0	1.2	3 34 47.03	2 33.691	—17.13	1.688				
4	Mars . . . S.P.	31.1	46.1	58.0	3 37 44.55	2 37.040						
5	Mars . . . N.P.	. .	. .	. .	. . . . .	2 35.290		3.451				
6	Lalande . . 12237 .	48.0	. .	15.2	3 38 01.60	2 33.589	17.05	1.701				
7	Mars . . . S.P.	40.1	55.0	7.0	3 42 53.55	2 36.741						
8	Mars . . . N. .	. .	. .	. .	. . . . .	2 35.078		3.251				
9	Lalande . . 12237 .	57.1	10.0	24.2	3 43 10.43	2 33.490	16.88	1.588				
10	Mars . . . S.P.	10.0	25.2	37.2	3 46 23.60	2 36.449						
11	Mars . . . N. .	. .	. .	. .	. . . . .	2 35.038		2.947				
12	Lalande . . 12237 .	. .	. .	54.2	3 46 40.69	2 33.502	17.09	1.536				
13	Mars . . . S.P.	4.8	18.2	31.0	3 48 17.90	2 36.290						
14	Mars . . . N. .	. .	. .	. .	. . . . .	2 35.022		2.781				
15	Lalande . . 12237 .	. .	36.0	49.2	3 48 35.69	2 33.509	17.79	1.513				
16	Mars . . . S.P.	20.2	35.2	47.3	3 55 33.75	2 36.622						
17	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.789		2.956				
18	Lalande . . 12237 .	38.5	52.0	5.1	3 55 51.87	2 33.666	18.12	1.123				
19	Mars . . . S.P.	12.1	28.2	39.5	4 2 25.80	2 36.455						
20	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.913		2.856				
21	Lalande . . 12237 .	30.1	. .	58.1	4 2 44.10	2 33.599	18.30	1.314				
22	Mars . . . S.P.	28.0	43.1	55.0	4 5 41.50	2 36.339						
23	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.858		2.708				
24	Lalande . . 12237 .	46.0	59.3	13.2	4 5 59.50	2 33.631	18.00	1.227				
25	Mars . . . S.P.	43.2	59.1	. .	4 10 56.71	2 36.335						
26	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.787		2.897				
27	Lalande . . 12237 .	2.5	. .	30.1	4 11 16.30	2 33.438	19.59	1.349				
28	Mars . . . S.P.	18.2	34.0	45.5	4 14 31.85	2 36.518						
29	Mars . . . N .	. .	. .	. .	. . . . .	2 34.740		3.031				
30	Lalande . . 12237 .	37.2	. .	4.8	4 14 51.00	2 33.487	19.15	1.253				
31	Mars . . . S.P.	13.4	29.1	41.0	4 18 27.20	2 36.270						
32	Mars . . . N. .	. .	. .	. .	. . . . .	2 34 638		2.734				
33 a	Lalande . . 12237 .	. .	46.0	. .	4 18 46.00	2 33.536	. . .	1.102				
34	Mars . . . S.P.	10.2	26.2	37.1	4 21 23.65	2 36.139						
35	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.712		2.663				
36	Lalande . . 12237 .	29.1	43.0	57.2	4 21 43.10	2 33.476	19.45	1.236				
37	Mars . . . S.P.	20.0	36.1	47.9	4 24 33.95	2 36.086						
38	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.651		2.561				
39	Lalande . . 12237 .	40.3	53.6	7.0	4 24 53.63	2 33.525	19.68	1.126				
40	Mars . . . S.P.	31.2	46.3	58.3	4 27 44.75	2 36.071						
41	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.570		2.581				
42	Lalande . . 12237 .	. .	4.0	18.2	4 28 04.00	2 33.490	19.25	1.080				
43	Mars . . . S.P.	14.1	29.2	41.0	4 31 27.55	2 36.170						
44	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.557		2.677				
45	Lalande . . 12237 .	34.3	47.3	1.0	4 31 47.53	2 33.493	19.98	1.064				
46	Mars . . . S.P.	17.2	31.5	44.2	4 35 30.70	2 35.985						
47	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.637		—2.504				
48	Lalande . . 12237 .	37.0	50.5	3.5	4 35 50.33	2 33.481	—19.63	1.156				
49	Mars . . . S.P.	30.3	45.4	. .	4 40 43.81	2 35.970						
50	Mars . . . N. .	. .	. .	. .	. . . . .	2 34.707						

NOVEMBER 26, 1849—Continued.

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
51	Lalande . .	12237 .	50.3	4.1	17.7	4 41 4.05	2 33.540	—20.24	—2.430 1.167				49.5
52	Mars . . .	S.P. .	11.1	. .	. .	4 43 24.61	2 35.873						
53	Mars . . .	N. .	. .	. .	. .	. . . .	2 34.569		2.390				
54	Lalande . .	12237 .	31.3	45.0	58.2	4 43 44.83	2 33.483	20.22	1.086				
55	Mars . . .	S.P. .	13.2	28.1	. .	4 46 26.71	2 35.798						
56	Mars . . .	N. .	. .	. .	. .	. . . .	2 34.430		2.330				
57	Lalande . .	12237 .	33.2	. .	0.0	4 46 46.60	2 33.468	19.89	0.962				
58	Mars . . .	S.P. .	30.3	45.5	58.0	5 3 44.15	2 35.667						
59	Mars . . .	N. .	. .	. .	. .	. . . .	2 34.350		2.102				
60	Lalande . .	12237 .	51.0	5.3	19.0	5 4 5.10	2 33.565	20.95	0.785				
61	Mars . . .	S.P. .	19.2	34.0	46.1	5 11 32.65	2 35.298						
62	Mars . . .	N. .	. .	. .	. .	. . . .	2 33.975		2.080				
63	Lalande . .	12237 .	40.2	53.8	7.7	5 11 53.90	2 33.218	21.25	0.757				
64	Mars . . .	S.P. .	9.9	25.2	37.2	5 14 23.55	2 35.233						
65	Mars . . .	N. .	. .	. .	. .	. . . .	2 33.941		2.028				
66	Lalande . .	12237 .	31.3	45.3	59.7	5 14 45.43	2 33.205	21.88	0.736				
67	Mars . . .	S.P. .	15.2	30.1	42.2	5 17 28.70	2 35.219						
68	Mars . . .	N. .	. .	. .	. .	. . . .	2 33.782		1.976				
69	Lalande . .	12237 .	37.0	50.7	4.2	5 17 50.63	2 33.243	21.93	0.539				
70	Mars . . .	S.P. .	25.2	40.9	. .	5 20 38.71	2 35.071						
71 *a*	Mars . . .	N. .	. .	. .	. .	. . . .	2 33.968		1.782				
72	Lalande . .	12237 .	48.0	1.3	14.6	5 21 1.30	2 33.289	. . .	0.679				
73	Mars . . .	S.P. .	38.0	53.1	. .	5 23 51.54	2 35.149						
74	Mars . . .	N. .	. .	. .	. .	. . . .	2 33.932		1.795				
75	Lalande . .	12237 .	59.2	13.7	27.0	5 24 13.30	2 33.357	21.76	0.575				
76	Mars . . .	S.P. .	35.2	50.1	. .	5 40 48.74	2 34.302						
77	Mars . . .	N. .	. .	. .	. .	. . . .	2 33.072		1.521				
78	Lalande . .	12237 .	58.5	12.1	25.4	5 41 12.00	2 32.781	23.26	0.291				
79	Mars . . .	S.P. .	25.8	41.0	. .	5 45 38.34	2 34.229						
80	Mars . . .	N. .	. .	. .	. .	. . . .	2 33.011		1.670				
81	Lalande . .	12237 .	49.0	3.1	16.4	5 46 2.83	2 32.559	24.49	0.452				
82	Mars . . .	S.P. .	30.8	46.1	. .	5 49 44.34	2 34.160						
83	Mars . . .	N. .	. .	. .	. .	. . . .	2 32.881		1.580				
84	Lalande . .	12237 .	54.8	8.1	21.8	5 50 8.23	2 32.580	23.89	0.301				
85	Mars . . .	S.P. .	0.0	15.2	27.0	5 55 13.50	2 34.130						
86	Mars . . .	N. .	. .	. .	. .	. . . .	2 32.790		1.550				
87	Lalande . .	12237 .	24.0	. .	51.1	5 55 37.55	2 32.580	24.05	0.210				
88	Mars . . .	S.P. .	32.1	47.2	. .	5 58 45.65	2 32.119						
89	Mars . . .	N. .	. .	.	. .	. . . .	2 30.780		—1.309				
90	Lalande . .	12237 .	56.1	9.3	23.1	5 59 9.50	2 30.810	23.85	+0.030				
91	Mars . . .	S.P. .	10.1	25.3	. .	6 1 23.64	2 32.232						
92	Mars . . .	N. .	. .	. .	. .	. . . .	2 30.671		—1.684				
93	Lalande . .	12237 .	34.0	47.0	. .	6 1 47.54	2 30.548	23.90	0.123				
94	Mars . . .	S.P. .	6.1	22.0	. .	6 5 19.64	2 32.058						
95	Mars . . .	N. .	. .	. .	. .	. . . .	2 30.591		1.596				
96	Lalande . .	12237 .	31.0	45.0	58.3	6 5 44.77	2 30.462	25.13	0.129				
97	Mars . . .	S.P. .	40.8	56.1	. .	6 43 54.33	2 44.255						
98	Mars . . .	N. .	. .	. .	. .	. . . .	2 43.040		—1.064				
99	Lalande . .	12237 .	7.1	20.3	34.1	6 44 20.50	2 43.191	— 26.17	+0.151				

NOVEMBER 26, 1849—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
100	Mars . . . S.P. .	45.2	0.3	. .	6 48 58.73	2 44.300						49.5
101	Mars . . . N. .	. .	. .	. .	. . . . .	2 42.940		—1.115				
102	Lalande . . 12237 .	12.3	26.1	39.3	6 49 25.90	2 43.185	—27.17	+0.245				
103	Mars . . . S.P. .	26.8	41.5	. .	6 52 40.33	2 44.348						
104	Mars . . . N. . .	. .	. .	. .	. . . . .	2 42.855		—1.137				
105	Lalande . . 12237 .	53.2	0.7	20.3	6 53 6.83	2 43.211	26.50	+0.356				
106	Mars . . . S.P .	3.0	18.1	. .	6 57 16.53	2 44.170						
107	Mars . . . N. . .	. .	. .	. .	. . . . .	2 42.841		—1.029				
108	Lalande . . 12237 .	29.5	43.0	57.0	6 58 43.16	2 43.141	26.63	+0.300				
109	Mars . . . S.P. .	6.2	21.0	. .	7 1 19.73	2 44.195						
110	Mars . . . N. . .	. .	. .	. .	. . . . .	2 42.757		—0.933				
111	Lalande . . 12237 .	33.0	46.1	0.0	7 1 46.37	2 43.262	26.64	+0.505				
112	Mars . . . S.P. .	26.1	41.3	. .	7 5 39.63	2 44.380						
113	Mars . . . N. . .	. .	. .	. .	. . . . .	2 42.642		—1.150				
114	Lalande . . 12237 .	53.6	7.1	21.0	7 6 7.23	2 43.230	27.60	+0.588				
115	Mars . . . S.P. .	10.7	26.2	. .	7 9 24.23	2 44.278						
116	Mars . . . N. . .	. .	. .	. .	. . . . .	2 42.768		—0.996				
117	Lalande . . 12237 .	39.2	52.6	6.0	7 9 52.60	2 43.282	27.37	+0.514				
118	Mars . . . S.P. .	55.4	11.1	. .	7 18 8.93	2 44.240						
119	Mars . . . N. . .	. .	. .	. .	. . . . .	2 42.585		—0.911				
120	Lalande . . 12237 .	24.0	37.5	. .	7 18 37.53	2 43.329	—28.60	+0.744				

Remarks.

Planet blurred, and star faint and unsteady. A 7.
α Omitted in mean.

Results.

	Mean of chronometer times.			Mars — * Δ α	Δ δ
		h. m. s.		m. s.	
Mars P.—Lalande 12237	Twenty-seven comparisons . .	4 37 31.15	. . . .	— 0 20.02	. . .
	Correction of chronometer . .	+ 1 32.34	Δ ρ . .	0.00	. . .
		h. m. s.			Rev.
Mars centre —Lalande 12237 . . .	Twenty-nine comparisons . .	4 36 16.78	. . . .		— 1.737
	Correction of chronometer . .	+ 1 32.34	. . . .		— 26″.70
			Δ ρ		— 0″.00
		h. m. s.		s.	Rev.
Mars P. and centre —Lalande 12237 .	Eleven comparisons	6 43 53.78	. . . . . .	— 26.32	— 0.446
	Correction of chronometer . .	+ 1 32.55	. . . .		— 6″.86
			Δ ρ . . .	0.00	— 0″.00

NOVEMBER 27, 1849.

No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Mars—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	38.1	53.2	5.0	3 40 51.55	2 35.663						43.5
2	Mars . . . N. . .	.	. .	. .	. . . . .	2 33.781						
3	9 *	5.2	18.0	32.0	3 42 18.40	2 45.700						
4	Mars . . . S.P. .	16.5	31.0	43.2	4 2 29.85	2 35.442						
5	Mars . . . N. . .	. .	. .	. .	. . . . .	2 33.851						
6	*	43.0	57.0	. .	4 3 57.03	2 45.639						
7	Lalande . . 12240 .	49.0	3.0	17.1	4 4 3.03	2 24.730	—1 33.18	—10.712 — 9.121				

Remarks.

Planet blurred and unsteady. Impossible to make comparisons within a revolution of micrometer. A 7.

DECEMBER 6, 1849.

No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Mars—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Lalande . . 11714 .	57.1	11.0	25.0	3 35 11.03	2 33.550	+17.97	+19.991	29.962	80.0		39.0
2	Mars . . . S.P. .	15.2	30.7	42.8	3 35 29.00	1 43.710						
3	Lalande . . 11714 .	46.2	59.5	13.1	3 45 59.60	2 33.739	17.85	21.448				
4	Mars . . . N.P. .	4.1	19.2	30.8	3 46 17.45	1 42.442						
5	Lalande . . 11684 .	48.1	1.3	15.1	3 49 1.50	2 27.273						
6	Lalande . . 11714 .	39.2	53.0	. .	3 49 53.07	2 33.710	17.33	20.251				
7	Mars . . . S.P. .	57.0	12.1	23.8	3 50 10.40	1 43.610						
8	Lalande . . 11684 .	1.0	15.0	28.4	3 54 14.80	2 27.355						
9	Lalande . . 11714 .	53.1	7.0	20.2	3 56 6.76	2 33.550	16.94	21.428				
10	Mars . . . N.P. .	10.2	25.1	37.2	3 56 23.70	1 42.273						
11	Lalande . . 11684 .	33.2	47.1	0.1	3 59 46.80	2 27.353						
12	Lalande . . 11714 .	24.6	38.0	52.0	4 0 38.20	2 33.593	16.30	20.147				
13	Mars . . . S.P. .	41.0	. .	8.0	4 0 54.50	1 43.597						
14	Lalande . . 11684 .	32.5	46.0	59.7	4 4 46.07	2 27.331						
15	Lalande . . 11714 .	24.2	38.0	51.0	4 5 37.73	2 33.583	15.77	21.643				
16	Mars . . . N.P. .	40.0	55.7	7.0	4 5 53.50	1 42.091						
17	Lalande . . 11684 .	24.2	38.1	52.0	4 10 38.10	2 27.530						
18	Lalande . . 11714 .	15.0	29.0	42.0	4 11 28.66	2 33.650	15.84	20.186				
19	Mars . . . S.P. .	31.0	46.1	58.0	4 11 44.50	1 43.615						
20	Lalande . . 11684 .	54.1	8.1	22.0	4 29 8.07	2 27.572						
21	Lalande . . 11714 .	46.2	59.0	13.0	4 29 59.40	2 33.559	14.55	20.331				
22	Mars . . . S.P. .	0.0	15.2	27.9	4 30 13.95	1 43.379						
23	Lalande . . 11684 .	17.1	31.0	44.0	4 33 30.70	2 27.490						
24	Lalande . . 11714 .	8.9	22.0	36.0	4 34 22.30	2 33.598	14.25	21.824				
25	Mars . . . N.P. .	23.1	38.3	50.0	4 34 36.55	2 41.925						
26	Lalande . . 11684 .	19.2	33.0	46.5	4 40 32.90	2 27.358						
27	Lalande . . 11714 .	11.0	24.0	38.0	4 41 24.33	2 23.503	13.95	20.172				
28	Mars . . . S.P. .	24.3	40.0	. .	4 41 38.28	1 43.382						
29	Lalande . . 11684 .	14.0	26.9	41.3	4 45 27.40	2 27.410						
30	Lalande . . 11714 .	5.0	. .	33.0	4 46 19.00	2 33.810	+13.50	+22.189				
31	Mars . . . N.P. .	18.9	34.3	46.1	4 46 32.50	1 41.772						

DECEMBER 6, 1849—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
32	Lalande . . 11684 .	36.0	49.3	3.0	4 59 49.43	2 27.385			29.962	80.0		39.0
33	Lalande . . 11714 .	27.0	. .	55.0	5 0 41.00	2 33.458	+12.40	+20.410				
34	Mars . . . S.P. .	39.8	55.2	7.0	5 0 53.40	1 43.199						
35	Lalande . . 11684 .	22.0	36.1	49.1	5 9 35.73	2 25.242						
36	Lalande . . 11714 .	14.0	. .	. .	5 10 27.74	2 31.342	10.95	21.941				
37	Mars . . . N.P. .	25.3	40.2	52.0	5 10 38.65	1 39.552						
38	Lalande . . 11684 .	53.0	7.0	20.5	5 17 6.83	2 25.291						
39	Lalande . . 11714 .	45.1	. .	12.0	5 17 58.55	2 31.373	11.00	20.874				
40	Mars . . . S.P. .	56.1	. .	23.0	5 18 9.55	1 40.650						
41	Lalande . . 11684 .	8.0	21.7	35.3	5 22 21.66	2 25.218						
42	Lalande . . 11714 .	0.0	. .	27.0	5 23 13.50	2 31.262	10.70	21.914				
43	Mars . . . N.P. .	10.3	. .	38.1	5 23 24.20	1 39.499						
44	Lalande . . 11684 .	20.4	34.2	48.1	5 27 34.23	2 25.200						
45	Lalande . . 11714 .	12.5	. .	39.7	5 28 26.10	2 31.221	10.55	20.692				
46	Mars . . . S.P. .	23.1	. .	50.2	5 28 36.65	1 40.680						
47	Lalande . . 11684	17.2	30.7	44.0	5 33 30.63	2 25.160						
48	Lalande . . 11714 .	9.0	. .	36.0	5 34 22.50	2 31.202	10.00	22.171				
49	Mars . . . N.P. .	19.0	. .	46.0	5 34 32.50	1 39.182						
50	Lalande . . 11684 .	37.5	53.0	7.0	5 39 52.50	2 24.990						
51	Lalande . . 11714 .	31.0	. .	58.0	5 40 44.50	2 31.181	9.91	20.842				
52	Mars . . . S.P. .	40.8	56.0	. .	5 40 54.41	1 40.490						
53	Lalande . . 11684 .	19.0	32.5	46.2	5 44 32.57	2 25.003						
54	Lalande . . 11714 .	10.5	. .	. .	5 45 24.06	2 30.980	9.41	22.040				
55	Mars . . . N.P. .	. .	33.0	47.0	5 45 33.47	1 39.091						
56	Lalande . . 11684 .	33.1	47.1	0.0	6 41 46.73	2 27.119						
57	Lalande . . 11714 .	. .	. .	52.0	6 42 38.47	2 33.363	6.30	20.554				
58	Mars . . . S.P. .	. .	. .	58.3	6 42 44.77	1 42.960						
59	Lalande . . 11684 .	4.7	18.1	32.0	6 48 18.27	2 27.239						
60	Lalande . . 11714 .	56.0	10.0	. .	6 49 9.67	2 33.130	5.00	20.341				
61	Mars . . . S.P. .	1.0	16.0	. .	6 49 14.67	1 42.940						
62	Lalande . . 11684 .	30.4	44.0	57.8	6 57 44.07	2 27.280						
63	Lalande . . 11714 .	23.0	36.0	49.0	6 58 36.00	2 33.190	3.50	21.401				
64	Mars . . . N.P. .	26.0	41.0	53.0	6 58 39.50	1 41.940						
65	Lalande . . 11684 .	19.2	33.0	46.2	7 5 32.80	2 27.455						
66	Lalande . . 11714 .	11.2	. .	38.0	7 6 24.60	2 33.370	3.00	22.384				
67	Mars . . . N.P. .	14.1	29.2	41.2	7 6 27.60	1 41.137						
68	Lalande . . 11684 .	34.6	48.1	1.7	7 10 48.13	2 37.498						
69	Lalande . . 11714 .	26.2	. .	53.2	7 11 39.70	2 33.610	+2.40	+20.976				
70	Mars . . . S.P. .	29.0	44.0	55.2	7 11 42.10	1 42.785						

Remarks.

The star 11714 was not well seen, and at some of the comparisons scarce visible. 11684 is larger and was more distinct than the other. The planet throughout was blazing and unsteady. The wind high. A 7.

Results.

	Mean of chronometer times.	h. m. s.		Mars — * Δ α. s.	Δ δ. Rev.
Mars S. P. —Lalande 11714 . .	Thirteen comparisons . .	5 9 34.32	. . . .	+11.81	+ 20.444
	Correction of chronometer	+ 1 53.21	. . . .		+ 5′ 14″.25
			Δ ρ	0.0	+ 0″.09

DECEMBER 6, 1849—Continued.

Results—Continued.

		Mean of chronometer times.		Mars centre — ✱ Δ α.	Δ δ.
		h. m. s.		s.	Rev.
Mars N. P. —Lalande 11714 . .	Eleven comparisons . .	5 11 49.06	. . . .	+11.44	+ 21.853
	Correction of chronometer	+ 1 53.21	. . . .		+ 5′ 35″.91
			Δ ρ	0.00	+ 0″.10

DECEMBER 11, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Rumker . . 1673 .	28.2	41.5	56.0	3 26 41.90	2 34.070	+16.00	+4.436	30.498	78.0	39.0	24.0
2	Mars . . . S.P. .	44.0	59.0	11.8	3 26 57.90	2 29.634						
3	Rumker . . 1673 .	12.3	26.1	39.3	3 29 25.90	2 34.151	16.75	6.190				
4	Mars . . . N.P. .	29.3	. .	56.0	3 29 42.65	2 27.961						
5	Rumker . . 1673 .	15.0	28.3	. .	3 32 28.30	2 34.059	15.95	4.698				
6	Mars . . . S.P. .	31.0	45.9	57.5	3 32 44.25	2 29.361						
7	Rumker . . 1673 .	8.3	22.1	. .	3 35 22.10	2 33.927	15.83	6.039				
8	Mars . . . N.P. .	24.3	39.0	50.5	3 35 37.93	2 27.888						
9	Rumker . . 1673 .	20.8	34.2	48.0	3 39 34.33	2 33.848	15.77	4.546				
10	Mars . . . S.P. .	36.5	51.6	3.7	3 39 50.10	2 29.302						
11	Rumker . . 1673 .	22.0	36.1	49.0	3 43 35.70	2 32.019	15.35	6.394				
12	Mars . . . N.P. .	37.5	53.2	. .	3 43 51.05	2 25.625						
13	Rumker . . 1673 .	14.0	29.2	42.0	3 48 28.40	2 32.149	14.85	4.835				
14	Mars . . . S.P. .	29.6	. .	56.9	3 48 43.25	2 27.314						
15	Rumker . . 1673 .	22.8	36.1	49.0	3 52 35.97	2 32.125	14.18	6.580				
16	Mars . . . N.P. .	36.5	. .	3.8	3 52 50.15	2 25.545						
17	Rumker . . 1673 .	21.1	34.0	48.0	3 55 34.37	2 32.086	13.53	5.039				
18	Mars . . . S.P. .	34.5	49.7	1.3	3 55 47.90	2 27.047						
19	Rumker . . 1673 .	18.5	31.0	. .	4 20 31.00	2 31.731	12.70	6.580				
20	Mars . . . N.P. .	30.3	45.2	57.1	4 20 43.70	2 25.151						
21	Rumker . . 1673 .	1.0	14.4	28.1	4 24 14.50	2 31.739	+12.25	+5.259				
22	Mars . . . S.P. .	13.2	29.0	. .	4 24 26.75	2 26.480						

Remarks.

Planet diffused and unsteady. Star scarcely visible. It was thought useless to continue the observations. A 5.

Results.

		Mean of chronometer times.		Mars — ✱ Δ α.	Δ δ.
		h. m. s.		s.	Rev.
Mars S. P. —Rumker 1673 . .	Six comparisons . . .	3 47 45.02	. . . .	+14.72	+ 4.802
	Correction of chronometer	+2 3.72	. . . .		+1′ 13″.81
			Δ ρ	0.00	0″.00
		h. m. s.		s.	Rev.
Mars N. P. —Rumker 1673 . .	Six comparisons . . .	3 48 33.08	. . . .	+14.56	+ 6.357
	Correction of chronometer	+2 3.72	. . . .		+1′ 37″.72
			Δ ρ	0.00	0″.00

DECEMBER 12, 1849.												
No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Mars—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	59.1	14.9	. .	3 51 12.78	2 38.900			30.566	77.0	33.0	22.5
2	Mars . . . N. . .	. .	. .	. .	. . . . .	2 37.518						
3	Rumker . . 1680 .	53.1	6.8	21.0	3 53 6.96	2 33.761	—1 54.18	—5.139				
4	Mars . . . N.P. .	19.0	34.2	46.8	3 55 32.90	2 37.525						
5	Rumker . . 1680 .	. .	26.8	41.0	3 57 26.98	2 33.745	1 54.08	3.780				
6	Mars . . . S.P. .	23.8	39.2	53.2	3 58 38.73	2 39.152						
7	Rumker . . 1680 .	. .	32.0	46.1	4 0 32.18	2 33.743	1 53.45	5.409				
8	Mars . . . N.P. .	15.8	31.1	42.9	4 2 29.35	2 37.472						
9	Rumker . . 1680 .	10.2	. .	39.0	4 4 24.60	2 33.642	1 55.25	3.830				
10	Mars . . . S.P. .	10.8	26.2	38.0	4 7 24.40	2 38.923						
11	Rumker . . 1680 .	6.0	19.2	33.0	4 9 19.40	2 33.830	1 55.00	5.093				
12	Mars . . . N.P. .	38.2	54.0	5.8	4 11 52.00	2 37.308						
13	Rumker . . 1680 .	34.1	47.9	1.2	4 13 47.73	2 33.670	1 55.73	3.638				
14	Mars . . . S.P. .	51.3	7.2	19.2	4 16 5.25	2 39.069						
15	Rumker . . 1680 .	. .	1.0	14.2	4 18 0.91	2 33.822	1 55.66	5.247				
16	Mars . . . S.P. .	9.3	25.1	37.0	4 33 23.15	2 39.058						
17	Rumker . . 1680 .	7.1	21.0	34.7	4 35 20.93	2 33.830	1 55.78	5.228				
18	Mars . . . N.P. .	56.0	10.9	23.1	4 36 9.55	2 37.330						
19	Rumker . . 1680 .	53.5	7.3	21.0	4 39 7.27	2 33.575	1 57.72	3.755				
20	Mars . . . S.P. .	51.2	5.9	18.0	4 41 4.60	2 38.430						
21	Rumker . . 1680 .	48.3	2.0	16.1	4 43 2.13	2 33.460	1 57.53	4.970				
22	Mars . . . N.P. .	32.1	47.9	59.3	4 46 45.70	2 37.178						
23	Rumker . . 1680 .	31.1	. .	58.5	4 48 44.80	2 33.491	1 59.10	3.687				
24	Mars . . . S.P. .	32.1	48.0	0.0	4 0 46.05	2 38.412						
25	Rumker . . 1680 .	32.1	46.0	0.0	4 2 46.03	2 33.413	1 59.98	4.999				
26	Mars . . . N.P. .	15.2	30.3	42.7	4 4 28.95	2 37.020						
27	Rumker . . 1680 .	14.4	28.0	42.0	4 6 28.13	2 33.632	1 59.18	3.398				
28	Mars . . . S.P. .	24.0	39.2	51.1	4 8 37.55	2 38.392						
29	Rumker . . 1680 .	24.2	37.5	51.5	4 10 37.73	2 33.353	2 0.18	5.039				
30	Mars . . . N.P. .	30.2	45.2	57.1	4 12 43.65	2 36.838						
31	Rumker . . 1680 .	30.5	44.0	57.3	4 14 43.93	2 33.453	—2 0.28	—3.385				

Remarks.

Planet disturbed and blazing; star of comparison scarcely visible. A 5.

Results.

		Mean of chronometer times.	Mars centre — * Δ α.	Δ δ.
		h. m. s.	m. s.	Rev.
Mars S. P. —Rumker 1680 . .	Eight comparisons	4 27 9.06	. . . . . — 1 56.47	— 5.140
	Correction of chronometer .	+ 2 6.42	. . . .	—1′ 19″.01
			Δ ρ 0.00	— 0″.02
		h. m. s.	m. s.	Rev.
Mars N. P. —Rumker 1680 . .	Seven comparisons	4 32 51.73	. . . . . — 1 57.33	— 3.639
	Correction of chronometer .	+ 2 6.42	. . . .	— 55″.94
			Δ ρ 0.00	— 0″.02

DECEMBER 17, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	* 9	3.1	17.1	30.8	3 15 17.00	2 33.982			30.28	78.0	44.5	36.0
2	Mars . . . S.P. .	. .	8.5	20.1	3 16 6.29	2 38.653						
3	Mars . . N. . .	. .	. .	. .	. . . . .	2 37.313						
4	B. Z. . . . 405.56	18.5	32.1	46.1	3 18 32.23	2 40.149	—2 25.94	+1.496 2.836				
5	* 9	50.7	5.1	18.3	3 22 4.70	2 33.993						
6	Mars . . . N.P. .	. .	55.2	7.1	3 22 53.29	2 37.402						
7	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.599						
8	B. Z. . . . 405.56	5.6	19.0	33.1	3 25 19.23	2 40.203	2 25.94	1.604 2.801				
9	* 9	33.2	47.1	1.3	3 27 47.20	2 34.092						
10	Mars . . . N.P. .	22.8	38.1	50.9	3 28 36.85	2 37.522						
11	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.688						
12	B. Z. . . . 405.56	48.0	2.1	16.0	3 31 2.03	2 40.189	2 25.18	1.501 2.667				
13	* 9	17.9	31.3	. .	3 32 31.30	2 34.001						
14	Mars . . . N.P. .	6.0	21.3	34.0	3 33 20.00	2 37.386						
15	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.722						
16	B. Z. . . . 405.56	32.9	46.1	0.0	3 35 46.33	2 40.263	2 26.33	1.541 2.877				
17	* 9	51.7	5.1	19.2	3 39 5.33	2 33.929						
18	Mars . . . S.P. .	. .	55.1	7.2	3 39 53.39	2 38.658						
19	B. Z. . . . 405.56	7.1	20.7	34.1	3 42 20.63	2 40.247	2 26.24	1.589				
20	* 9	30.5	44.1	58.2	3 43 44.26	2 33.950						
21	Mars . . . N.P. .	18.1	32.0	45.8	3 44 31.95	2 37.400						
22	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.679						
23	B. Z. . . . 405.56	. .	59.1	13.2	3 46 59.26	2 40.219	2 27.31	1.540 2.819				
24	* 9	23.2	37.2	. .	3 48 37.20	2 33.851						
25	Mars . . . N.P. .	11.1	26.1	39.0	3 49 25.33	2 37.323						
26	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.701						
27	B. Z. . . . 405.56	39.2	52.3	. .	3 51 52.41	2 40.261	2 27.08	1.560 2.938				
28	* 9	58.7	12.3	26.2	3 54 12.40	2 34.021						
29	Mars . . . N.P. .	. .	0.5	13.0	3 54 59.19	2 37.385						
30	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.532						
31	B. Z. . . . 405.56	. .	. .	41.6	3 57 27.32	2 40.228	2 28.13	1.696 2.843				
32	* 9	19.3	33.1	46.8	4 0 33.06	2 34.018						
33	Mars . . . N.P. .	. .	21.1	33.0	4 1 19.19	2 37.312						
34	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.542						
35	B. Z. . . . 405.56	34.5	48.1	1.7	4 3 48.10	2 40.298	2 28.91	1.756 2.986				
36	* 9	28.2	41.7	55.0	4 5 41.63	2 33.971						
37	Mars . . . N.P. .	. .	29.3	42.1	4 6 28.29	2 37.301						
38	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.648						
39	B. Z. . . . 405.56	43.0	. .	10.8	4 8 56.90	2 40.249	2 28.61	1.601 2.948				
40	* 9	22.3	36.4	50.0	4 10 36.23	2 33.860 .925						
41	Mars . . . N.P. .	9.2	24.7	37.0	4 11 23.10	2 37.120						
42	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.479						
43	B. Z. . . . 405.56	38.0	51.1	5.0	4 13 51.36	2 40.085 .209	2 28.26	1.668 3.027				
44	* 9	3.7	17.2	30.0	4 16 16.96	2 33.922 .880						
45	Mars . . . N.P. .	48.2	3.9	16.2	4 17 2.20	2 37.240						
46	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.598						
47	B. Z. . . . 405.56	18.2	31.7	45.5	4 19 31.80	2 40.165	—2 29.60	1.567 +2.925				
48	* 9	19.0	33.1	. .	4 21 33.10	2 33.918 .750						
49 a	Mars . . . N.P. .	3.9	19.3	31.7	4 22 17.80	2 37.151						
50	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.498						

DECEMBER 17, 1849—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
51	* 9	41.2	55.1	8.3	4 39 54.86	2 33.930			30.28	78.0	44.5	36.0
52	Mars . . . N.P. .	. .	40.2	51.0	4 40 38.19	2 36.869						
53	Mars . . . S. . .	. .	. .	. .	. . . . .	2 38.352						
54	B. Z. . . . 405.56	56.1	9.3	23.2	4 42 9.53	2 39.879	—2 31.34	+1.527 3.010				
55	* 9	33.7	47.5	1.5	4 45 47.56	2 33.868						
56	Mars . . . S.P. .	. .	32.5	. .	4 46 31.11	2 38.009						
57	Mars . . . N. . .	. .	. .	. .	. . . . .	2 36.851						
58	B. Z. . . . 405.56	48.7	2.3	16.0	4 49 2.33	2 39.879	2 31.22	1.870 3.028				
59	* 9	26.3	39.7	. .	4 56 39.70	2 37.950						
60	Mars . . . S.P. .	8.0	24.1	36.2	4 57 22.76	2 42.832						
61	B. Z. . . . 405.56	41.5	55.0	9.0	4 59 55.16	2 44.122	2 32.40	1.290				
62	* 9	17.2	31.0	. .	5 1 31.00	2 37.830						
63	Mars . . . S.P. .	58.3	14.3	26.0	5 2 12.15	2 42.591						
64	B. Z. . . . 405.56	32.1	46.1	59.3	5 4 45.83	2 44.130	2 33.68	1.539				
65	* 9	38.1	52.3	5.2	5 7 51.86	2 37.842						
66	Mars . . . S.P. .	. .	35.2	47.2	5 8 33.39	2 42.283						
67	B. Z. . . . 405.56	53.0	. .	20.9	5 10 6.95	2 44.092	2 33.56	1.809				
68	* 9	22.3	36.0	50.0	5 15 3[illegible].10	2 36.183						
69	Mars . . . N.P. .	. .	. .	31.0	5 16 17.19	2 39.112						
70	B. Z. . . . 405.56	37.2	51.5	5.3	5 20 51.33	2 42.379	2 34.14	3.267				
71	* 9	14.0	28.1	. .	5 21 28.10	2 36.140						
72	Mars . . . S.P. .	53.9	9.0	22.0	5 22 7.95	2 40.422						
73	B. Z. . . . 405.56	29.0	43.1	56.1	5 24 42.73	2 42.309 .395	2 34.78	1.930				
74	* 9	41.1	. .	8.2	5 26 54.65	2 36.069						
75	Mars . . . S.P. .	20.8	36.2	49.1	5 27 34.95	2 40.380						
76	B. Z. . . . 405.56	56.2	9.7	23.2	5 30 9.70	2 42.303	2 34.75	1.923				
77	* 9	29.1	43.0	. .	5 58 43.00	2 34.610						
78	Mars . . . N.P. .	. .	22.1	34.0	5 59 20.19	2 37.382						
79	B. Z. . . . 405.56	43.1	57.1	11.0	6 01 57.06	2 40.816	2 36.87	3.434				
80	* 9	28.1	41.9	. .	6 5 41.90	2 34.853						
81	Mars . . . S.P. .	. .	20.2	32.5	6 6 18.69	2 39.082						
82	B. Z. . . . 405.56	43.1	57.2	10.5	6 8 56.93	2 41.150	2 38.24	2.068				
83	* 9	5.2	19.0	. .	6 11 19.00	2 34.972						
84 *a*	Mars . . . N.P. .	. .	56.1	9.0	6 11 55.19	2 37.642						
85	B. Z. . . . 405.56	22.0	36.1	49.5	6 14 35.86	2 41.249						
86	* 9	57.2	11.0	. .	6 16 11.00	2 34.995						
87	Mars . . . S.P. .	. .	48.5	0.8	6 17 46.99	2 39.235						
88	B. Z. . . . 405.56	12.2	26.0	39.6	6 20 25.93	2 41.288	2 38.94	2.053				
89	* 9	5.0	19.1	. .	6 23 19.10	2 35.078						
90	Mars . . . S.P. .	. .	. .	8.2	6 25 54.39	2 39.152						
91	B. Z. . . . 405.56	. .	34.0	47.7	6 27 33.89	2 41.278	2 39.50	2.126				
92	* 9	11.3	25.5	39.0	6 29 25.26	2 35.071						
93	Mars . . . N.P. .	46.3	1.8	13.8	6 31 0.05	2 37.832						
94	B. Z. . . . 405.56	. .	39.5	54.3	6 33 39.39	2 41.295	—2 39.40	+3.463				

Remarks.

From 4*h*. to 4.15, comparisons good. During the remainder the planet blurred and restless. A 6.

a Not used.

DECEMBER 17, 1849—Continued.

Results.

		Means of chronometer times.		Mars — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Mars N. P. — B. Z 405.56 . .	Sixteen comparisons . .	4 18 41.53	. . . .	—2 29.61	+ 2.991
	Correction of chronometer	+2 19.18	. . . .		+45″.98
			Δ ρ	0.00	+ 0″.02
		h. m. s.		m. s.	Rev.
Mars S. P. — B. Z. 405.56 . .	Twenty-two comparisons.	4 31 51.35	. . . .	—2 30.69	+ 1.693
	Correction of chronometer	+2 19.20	. . . .		+26″.02
			Δ ρ		+ 0″.01

DECEMBER 27, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	41.0	56.1	8.0	2 45 54.50	2 39.348			30.200	75.0	29.0	29.0
2	B. Z. . . . 405.28	57.3	11.4	25.2	2 48 11.30	2 36.890	—2 16.80	—2.458				
3	Mars . . . N.P. .	31.2	47.1	58.9	2 51 45.05	2 38.039						
4	B. Z. . . . 405.28	48.3	1.8	15.8	2 54 1.96	2 37.028	2 16.81	1.011				
5 a	Mars . . . S.P. .	28.1	43.0	55.2	2 56 41 65	2 39.170						
6 a	B. Z. . . . 405.28	49.7	3.5	17.5	2 59 3.56	2 37.061 .910						
7	Mars . . . S.P. .	29.8	45.1	57.2	3 0 43.50	2 39.141						
8	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.091						
9	B. Z. . . . 405.28	. .	0.8	15.0	3 3 0 69	2 37.040	2 17.19	1.051 2.101				
10	Mars . . . S.P. .	6.8	22.1	34.1	3 7 20.45	2 39.419						
11	B. Z. . . . 405.28	24.1	38.2	52.0	3 9 38.10	2 37.082	2 17.65	2.337				
12	Mars . . . S.P. .	16.9	32.1	43.8	3 12 30.35	2 39.128						
13	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.104						
14	B. Z. . . . 405.28	35.2	49.5	3.0	3 14 49.23	2 37.048	2 18.88	1.056 2.080				
15	Mars . . . S.P. .	7.1	22.2	31.2	3 16 20.65	2 39.101						
16	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.129						
17	B. Z. . . . 405.28	25.8	39.5	53.1	3 18 39.46	2 37.041	2 18.81	1.080 2.061				
18	Mars . . . S.P. .	37.1	52.2	3.6	3 19 50.35	2 39.132						
19	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.112						
20	B. Z. . . . 405.28	55.0	9.2	22.7	3 22 8.96	2 37.068	2 18.61	1.044 2.074				
21	Mars . . . S.P. .	5.9	20.8	33.3	3 23 19.60	2 39.390						
22	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.169						
23	B. Z. . . . 405.28	24.8	39.0	52.5	3 25 38.76	2 37.087	2 19.16	1.082 2.303				
24	Mars . . . S.P. .	27.9	43.1	55.0	3 26 41.45	2 39.143						
25	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.068						
26	B. Z. . . . 405.28	46.6	0.5	14.0	3 29 0.36	2 37.068	2 18.91	1.000 2.075				
27	Mars . . . S.P. .	6.2	. .	33.4	3 31 19.80	2 39.463						
28	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.133						
29	B. Z. . . . 405.28	15.2	29.1	43.0	3 33 29.10	2 37.068	2 19.30	1.065 2.395				
30	Mars . . . S.P. .	1.8	17.9	30.0	3 37 15.90	2 39.409						
31	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.188						
32	B. Z. . . . 405.28	22.5	36.5	50.1	3 39 36.37	2 36.969	2 20.47	1.219 2.440				
33	Mars . . . S.P. .	58.1	13.1	25 0	3 43 11.55	2 39.490						
34	Mars . . . N. . .	. .	. .	. .	. . . . .	2 38.105						
35	B. Z. . . . 405.28	18.0	32.0	46.1	3 45 32.03	2 37.080	—2 20 48	1.025 —2.410				

DECEMBER 27, 1849—Continued.

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires	Mier.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
36	Mars . . .	S.P. .	12.8	28.1	. .	3 49 26.53	2 39.540			30.200	75.0	29.0	29.0
37	Mars . . .	N. . .	. .	. .	. .	. . . . .	2 38.105		—1.075				
38	B. Z. . . .	405.28	33.2	47.1	0.5	3 51 46.93	2 37.030	—2 20.40	2.510				
39	Mars . . .	S.P. .	39.1	55.1	7.0	4 8 53.05	2 39.595						
40	Mars . . .	N. . .	. .	. .	. .	. . . . .	2 38.119		1.218				
41	B. Z. . . .	405.28	1.5	15.3	29.0	4 10 15.27	2 36.901	2 22.22	2.694				
42	Mars . . .	S P. .	3.1	18.0	30.0	4 18 16.55	2 39.529						
43	Mars . . .	N. .	. .	. .	. .	. . . . .	2 38.190		1.110				
44	B. Z. . . .	405.28	25.0	39.0	52.7	4 20 38.90	2 36.990 .170	2 22.35	2.449				
45	Mars . . .	S P. .	39.2	54.1	6.0	4 23 52.60	2 39.440						
46	Mars . . .	N. .	. .	. .	. .	. . . . .	2 38.282		1.341				
47	B. Z. . . .	405.28	2.0	15.3	29.0	4 26 15.43	2 36.941	2 22.83	2.499				
48	Mars . . .	S.P. .	5.0	20.8	33.0	4 30 19.00	2 39.582						
49	Mars . . .	N. . .	. .	. .	. .	. . . . .	2 38.278		0.979				
50	B. Z. . . .	405.28	28.7	43.1	57.0	4 32 42.93	2 37.299	2 23.93	2.283				
51	Mars . . .	S P. .	. .	47.1	. .	4 37 45.42	2 39.530						
52	Mars . . .	N. . .	. .	. .	. .	. . . . .	2 38.430		1.498				
53	B. Z. . . .	405.28	56.0	9.6	25.0	4 40 9.53	2 36.937 .928	2 24.11	2.598				
54	Mars . . .	S.P. .	. .	19.3	31.0	4 42 17.51	2 39.260						
55	Mars . . .	N. . .	. .	. .	. .	. . . . .	2 38.058		1.125				
56	B. Z. . . .	405.28	29.1	42.5	56.0	4 44 42.53	2 36.933	2 25.02	2.327				
57	Mars . . .	S.P. .	6.0	22.1	33.7	4 47 19.85	2 39.168						
58	Mars . . .	N. . .	. .	. .	. .	. . . . .	2 38.032		1.154				
59	B. Z. . . .	405.28	31.0	45.2	58.7	4 49 44 97	2 36.878	2 25.12	2.290				
60	Mars . . .	S P. .	9.3	25.2	37.0	4 51 23.15	2 39.192						
61	Mars . . .	N. . .	. .	. .	. .	. . . . .	2 38.009		1.094				
62	B. Z. . . .	405.28	34.2	48.3	1.7	4 53 48.07	2 36.915	2 24.92	2.277				
63	Mars . . .	S.P. .	24.1	39.3	. .	4 56 37.91	2 39.322						
64	B. Z. . . .	405.28	50.0	4.1	18.0	4 59 4.03	2 36.790	2 26.12	2.532				
65	Mars . . .	S.P. .	. .	28.0	39.2	5 1 25.71	2 39.250						
66	Mars . . .	N. . .	. .	. .	. .	. . . . .	2 37.840		—1.040				
67	B. Z. . . .	405.28	37.2	. .	5.0	5 3 51.10	2 36.800	—2 25.39	2.450				

Remarks.

a Rejected.

The dome was entirely open during these comparisons; nevertheless, at times they were quite unsatisfactory. A 8.

Results.

		Mean of chronometer times.		Mars — ⋆ Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Mars S.P.—B. Z. 405.28 . .	Twenty-two comparisons . .	3 56 0.24	. . . .	—2 21.30	— 2.348
	Correction of chronometer . .	+2 34.48	. . . .		—0 36″.09
			Δ ρ	0.00	— 0″.01
		h. m. s.		m. s.	Rev.
Mars N.P.—B. Z. 405.28 . .	Twenty comparisons . . .	3 55 41.88	. . . .	—2 21.25	— 1.114
	Correction of chronometer . .	+2 34.48	. . . .		—0 17″.52
			Δ ρ	0.00	— 0″.00

DECEMBER 31, 1849.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	19.1	35.0	47.0	3 21 33.05	2 37.875			30.330	72.0	31.0	14.0
2	Mars . . . N. . .	. .	. .	. .	. . . . .	2 36.022					27.0	
3	B. Z. . . . 405.15	26.0	. .	54.4	3 21 40.20	2 42.318	— 7.15	+6.296 4.443				
4	Mars . . . S.P. .	55.8	10.9	23.0	3 29 9.40	2 37.650						
5	Mars . . . N. . .	. .	. .	. .	. . . . .	2 35.960						
6	B. Z. . . . 405.15	. .	. .	29.7	3 29 15 96	2 42.021	6.56	6.061 4.371				
7	Mars . . . S.P. .	10.8	26.0	37.0	3 32 23.90	2 37.688						
8	B. Z. . . . 405.15	17.2	30.8	45.0	3 32 31.00	2 42.012	7.10	4.324				
9	Mars . . . N.P. .	33.7	49.2	0.0	3 35 46.85	2 35.739						
10	B. Z. . . . 405.15	. .	54.8	8.0	3 35 54.98	2 42.220	8.13	6.481				
11	Mars . . . S.P. .	2.9	18.5	29.7	3 38 16.30	2 37.550						
12	B. Z. . . . 405.15	11.0	24.3	38.1	3 38 24.47	2 42.160	8.17	4.610				
13	Mars . . . N.P. .	48.1	3.5	15.0	3 41 1.55	2 35.942						
14	B. Z. . . . 405.15	55.0	9.0	23.0	3 41 9.00	2 42.088	7.45	6.146				
15	Mars . . . S.P. .	8.3	24.0	35.7	3 44 22.00	2 37.636						
16	B. Z. . . . 405.15	16.1	. .	43.5	3 44 29.80	2 42.092	7.80	4.456				
17	Mars . . . N.P. .	21.0	36.2	48.0	3 46 34.50	2 35.802						
18	B. Z. . . . 405.15	29.1	42.5	56.0	3 46 42.53	2 41.843	8.03	6.041				
19	Mars . . . S P. .	29.1	44.3	55.8	3 48 42.45	2 37.279						
20	B. Z. . . . 405.15	37.2	51.0	4.6	3 48 50.93	2 41.840	8.48	4.561				
21	Mars . . . N P. .	16.1	32.0	. .	4 6 29.70	2 35.562						
22	B. Z. . . . 405.15	26.2	39.5	53.0	4 6 39.57	2 42.081	9.87	6.519				
23	Mars . . . S.P. .	58.5	14.1	. .	4 12 12.10	2 37.590						
24	B. Z. . . 405.15	8.0	21.6	35.2	4 12 21.60	2 41.840	9.50	4.250				
25	Mars . . . S.P. .	14.0	29.2	40.7	4 22 27.35	2 37.305						
26	B. Z. . . . 405.15	24.0	38.0	51.0	4 22 37.66	2 41.750	10.31	4.445				
27	Mars . . . N.P. .	9.1	24.0	. .	4 24 22.70	2 35 801						
28	B. Z. . . . 405.15	19.1	32.0	46.0	4 24 32.37	2 41.587	9.67	5.786				
29	Mars . . . S.P. .	11.2	26.0	. .	4 26 24.80	2 37.038						
30	B. Z. . . . 405.15	21.0	34.8	48.5	4 26 34.77	2 41.592	9.97	4.554				
31	Mars . . . N.P. .	9.5	24.8	. .	4 29 23.10	2 35.620						
32	B. Z. . . . 405.15	20.0	34.0	47.7	4 29 33.90	2 41.384	10.80	5.764				
33	Mars . . . S.P. .	47.2	. .	14.5	4 32 0.85	2 36.793						
34	B. Z. . . . 405.15	58.0	11.5	25.0	4 32 11.50	2 41.435	10.65	4.642				
35	Mars . . . N.P. .	45.2	. .	12.3	4 34 58.75	2 35.281						
36	B. Z. . . . 405.15	56.5	10.5	23.4	4 35 10.13	2 41.232	11.38	5.951				
37	Mars . . . S.P. .	43.2	. .	11.0	4 38 57.10	2 36.695						
38	B. Z. . . . 405.15	54.3	8.0	21.5	4 39 7.93	2 41.345	10.83	4.650				
39	Mars . . . N.P. .	20.8	. .	49.2	4 41 35.00	2 35.471						
40	B. Z. . . . 405.15	33.1	46.0	0.2	4 41 46.43	2 41.259	11.43	5.788				
41	Mars . . . S.P. .	6.1	. .	33.4	4 46 19.75	2 36.501						
42	B. Z. . . . 405.15	17.5	31.5	45.0	4 46 31.33	2 41.099	11.58	4.598				
43	Mars . . . N.P. .	16.2	. .	43.6	4 48 29.90	2 35.319						
44	B. Z. . . . 405.15	27.9	41.5	55.6	4 48 41.66	2 41.011	11.76	5.692				
45	Mars . . . S.P. .	0.8	. .	28.0	4 51 14.40	2 36.598						
46	B Z. . . . 405.15	12.2	26.2	39.7	4 51 26.03	2 41.120	—11.63	+4.522				

DECEMBER 31, 1849—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
47	Mars . . . N.P. .	29.0	. .	56.0	4 53 42.50	2 35.150						
48	B. Z. . . . 405.15	41.0	54.3	8.0	4 53 54.43	2 41.058	—11.93	+5.908				

Remarks.

These observations unsatisfactory. The planet and star blurred and tremulous. A 8.

Results.

		Mean of chronometer times.		Mars — * Δ α.		Δ δ.
		h. m. s.		m. s.		Rev.
Mars S. P. —B. Z. 405.15 . .	Thirteen comparisons . . .	4 6 27.96	. . . . .	— 0 9.21	+	4.495
	Correction of chronometer .	+2 46.40	. . . .		+1′	9″.09
			Δ ρ	0.00	+	0″.02
		h. m. s.		m. s.		Rev.
Mars N. P. —B. Z. 405.15 . .	Twelve comparisons . . .	4 9 25.92	. . . . .	— 0 9.51	+	6.036
	Correction of chronometer .	+ 2 46.40	. . . .		+1′	32″.78
			Δ ρ	0.00	+	0″.03

JANUARY 5, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	11.8	27.1	39.0	2 55 25.40	2 44.182						
2	B. Z. . . . 523.15	23.0	36.0	49.5	2 57 36.17	2 36.419	—2 10.77	—7.763	30.342	77.0		24.0
3	Mars . . . S.P. .	28.9	44.1	56.0	3 6 42.50	2 44.060						
4	B. Z. . . . 523.15	40.3	53.5	7.0	3 8 53.60	2 36.113	2 11.10	7.947				
5	Mars . . . N.P. .	42.8	58.6	10.5	3 10 56.65	2 42.598						
6	B. Z. . . . 523.15	54.7	8.2	22.5	3 13 8.47	2 36.139	2 11.82	6.459				
7	Mars . . . S.P. .	55.8	11.0	23.1	3 15 9.45	2 43.982						
8	B.Z. . . . 523.15	7.3	21.4	34.8	3 17 21.17	2 35.952	2 11.72	8.030				
9	Mars . . . N.P. .	50.0	5.3	17.9	3 19 3.95	2 42.649						
10	B. Z. . . . 523.15	2.7	15.7	29.0	3 21 15.80	2 35.982	2 11.85	6.667				
11	Mars . . . S.P. .	5.6	21.3	33.0	3 23 19.30	2 43.910						
12	B. Z. . . . 523.15	18.0	31.5	45.0	3 25 31.50	2 35.859	2 12.20	8.051				
13	Mars . . . N P. .	15.8	31.3	43 0	3 27 29.40	2 42.653						
14	B. Z. . . . 523.15	28.3	42.0	55.5	3 29 41.93	2 35.761	2 12.53	6.892				
15	Mars . . . S.P. .	34.9	50.2	2.0	3 33 48.45	2 43.870						
16	B. Z. . . . 523.15	47.0	1.3	15 2	3 36 1.17	2 35.777	2 12.72	8.093				
17	Mars . . . S.P. .	54.0	9.2	21.8	3 38 7.90	2 43.815						
18	B. Z. . . . 523.15	7.0	21.0	34.0	3 40 20.66	2 35.940	2 12.76	7.875				
19	Mars . . . N.P. .	30.8	45.9	57.9	3 59 44.35	2 42.611						
20	B. Z. . . . 523.15	45.0	. .	12.5	4 1 58.75	2 36.010	—2 14.40	—6.601				

JANUARY 5, 1850—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
21	Mars . . . S.P. .	24.9	40.3	51.8	4 4 38.35	2 44.165						
22	B. Z. . . . 523.15	. .	52.3	6.0	4 6 52.27	2 35.871	—2 13.92	—8.294	30.342	77.0		24.0
23	Mars . . . N.P. .	18.0	33.2	45.5	4 8 31.75	2 42.672						
24	B. Z. . . . 523.15	31.9	46.3	0.3	4 10 46.17	2 35 920	2 14.42	6.752				
25	Mars . . . S.P. .	48.7	3.5	16.2	4 13 2.45	2 43.860						
26	B. Z. . . . 523.15	2.5	16.0	. .	4 15 15.97	2 35.791	2 13.52	8.609				
27	Mars . . . N.P. .	39.2	54.2	6.0	4 16 52.60	2 42.649						
28	B. Z. . . . 523.15	54.1	7.5	. .	4 19 7.47	2 35.802	2 14.87	6.847				
29	Mars . . . S.P. .	20.9	36.2	48.0	4 23 34.45	2 43.923						
30	B. Z. . . . 523.15	36.0	49.5	. .	4 25 49.47	2 35.728	2 15.02	8.195				
31	Mars . . . N.P. .	16.0	31.0	43.0	4 27 29.50	2 42.521						
32	B. Z. . . . 523.15	30.1	44.0	. .	4 29 43.97	2 35.611	2 14.47	6.910				
33	Mars . . . S.P. .	18.9	34.3	47.1	4 31 33.00	2 43.185						
34	B. Z. . . . 523.15	34.3	48.0	. .	4 33 47.97	2 35.640	2 14.97	7.545				
35	Mars . . . N.P. .	3.9	19.3	31.3	4 36 17.60	2 42.691						
36	B. Z. . . . 523.15	20.0	33.5	. .	4 38 33.47	2 35.657	2 15.87	7.034				
37	Mars . . . S.P. .	12.2	27.3	39.0	4 40 25.60	2 43.942						
38	B. Z. . . 523.15	27.5	41.3	. .	4 42 41.27	2 35.701	2 15.67	8.241				
39	Mars . . . N.P. .	11.2	26.3	38.2	4 44 24.70	2 42.157						
40	B. Z. . . 523.15	26.5	41.0	. .	4 46 40.97	2 35.490	2 16.27	6.667				
41	Mars . . . S.P. .	21.2	36.7	49.1	4 49 35.15	2 43.819						
42	B. Z. . . . 523 15	38.0	51.2	. .	4 51 51.17	2 35.506	2 16.02	8.313				
43	Mars . . . N.P. .	56.5	11.8	24.0	4 54 10.25	2 42.535						
44	B. Z. . . . 523.15	53.0	. .	. .	4 56 26.72	. . .						
45	Mars . . . N.P. .	56.8	12.0	24.0	5 0 10.40	2 42.405						
46	B. Z. . . . 523.15	14.0	. .	41.0	5 2 27.50	2 35.440	2 17.10	6.965				
47	Mars . . . S.P. .	30.0	45.0	57.0	5 49 43.50	2 43.128						
48	B. Z. . . . 523.15	48.5	3.0	. .	5 52 3.97	2 34.751						
49	Mars . . . N.P. .	21.9	37.2	49.3	5 54 35.60	2 41.842						
50	B. Z. . . . 523.15	40.2	54.0	. .	5 56 53.97	2 34.912	2 18.37	6.930				
51	Mars . . . S.P. .	43.0	58.3	10.0	5 58 56.50	2 43.142						
52	B. Z. . . . 523.15	1.2	14.5	28.2	6 1 14.63	2 34.912	2 18.13	8.230				
53	Mars . . . N.P. .	48.0	4.0	15.3	6 4 1.65	2 41.707						
54	B. Z. . . . 523.15	7.0	21.0	. .	6 6 20.97	2 35.039	—2 19.32	—6.668				

Remarks.

Night misty; star of comparison indistinct.

Between the observations of December 31 and January 5, the chronometer was set forward 4 *m*. A 6.

Results.

		Mean of chronometer time.		Mars — ✶ Δ α.	Δ δ.
			h. m. s.	m. s.	Rev.
Mars S. P. — B. Z. 523.15 . .	Thirteen comparisons . .	4 2 38.35	. . . .	—2 13.73	— 7.937
	Correction of chronometer .	—1 3.10	. . . .		2′ 2″.00
			Δ ρ		— 0″.04
			h. m. s.	m. s.	Rev.
Mars N. P. — B. Z. 523.15. .	Twelve comparisons . .	4 25 48.43	. . . .	—2 15.11	— 6.782
	Correction of chronometer .	—1 3.08	. . . .		1′ 44″.25
			Δ ρ		— 0″.03

JANUARY 9, 1850.

No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Mars—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . N.P. .	55.1	10.9	22.8	2 53 8.95	2 55.391			30.164	76.0		33.0
2	B. Z. . . . 523.15	54.3	8.0	22.0	2 59 8.10	1 62.939	—5 59.15	—22.603				
3	Mars . . . S.P. .	15.1	30.9	43.1	3 1 29.10	2 56.779						
4	B. Z. . . . 523.15	15.2	29.0	42.0	3 7 28.73	1 63.064	5 59.63	23.866				
5	Mars . . . S.P. .	1.8	16.2	28.9	3 11 15.35	2 56.668						
6	B. Z. . . . 523.15	2.0	15.0	29.0	3 17 15.33	1 63.145	5 59.98	23.674				
7	Mars . . . N.P. .	42.2	57.5	9.1	3 18 55.65	2 55.545						
8	B. Z. . . . 523.15	43.2	. .	10.3	3 24 56.75	1 63.222	6 1.10	22.474				
9	Mars . . . S.P. .	33.1	48.3	0.9	3 26 47.00	2 56.662						
10	B. Z. . . . 523.15	34.1	47.3	1.5	3 32 47.63	1 63.110	6 0.63	23.703				
11	Mars . . . N.P. .	2.4	18.0	30.2	3 35 16.30	2 55.631						
12	B. Z. . . . 523.15	3.7	17.0	31.0	3 41 17.23	1 63.480	6 0.93	22.302				
13	Mars . . . S.P. .	13.2	28.1	40.7	3 44 26.95	2 56.662						
14	B. Z. . . . 523.15	15.5	29.0	42.8	3 50 29.10	1 63.389	6 2.15	23.424				
15	Mars . . . N.P. .	31.1	46.2	58.7	3 54 44.90	2 55.703						
16	B. Z. . . . 523.15	32.7	47.0	0.8	4 0 46.83	1 63.128	6 1.93	22.726				
17	Mars . . . S.P. .	28.7	44.1	56.2	4 12 42.45	2 56.857						
18	B. Z. . . . 523.15	30.9	45.0	59.1	4 18 45.00	1 63.271	6 2.55	23.737				
19	Mars . . . N.P. .	0.2	15.3	27.7	4 21 13.95	2 55.880						
20	B. Z. . . . 523.15	3.0	16.5	30.0	4 27 16.50	1 63.272	6 2.55	22.759				
21	Mars . . . S.P. .	25.8	41.0	53.5	4 29 39.65	2 56.780						
22	B. Z. . . . 523.15	29.1	43.0	. .	4 35 42.91	1 63.265	6 3.26	23.666				
23	Mars . . . N.P. .	47.1	2.4	14.7	4 40 0.90	2 55.710						
24	B. Z. . . . 523.15	49.7	3.6	18.0	4 46 3.77	1 63.190	6 2.87	22.671				
25	Mars . . . S.P. .	3.2	18.3	30.2	5 16 16.70	2 59.301						
26	B. Z. . . . 523.15	7.1	21.3	35.0	5 22 21.13	1 66.010	6 4.43	23.441				
27	Mars . . . N.P. .	20.1	36.0	48.1	5 25 34.10	2 58.122						
28	B. Z. . . . 523.15	24.0	39.0	53.0	5 31 38.66	1 65.341	—6 4.56	—22.932				

Remarks.

The night misty; star of comparison scarcely visible. A 7.

Results.

		Mean of chronometer times.		Mars — * Δ α.	Mars — * Δ δ.
		h. m. s.		m. s.	Rev.
Mars S. P. —B. Z. 523.15 . .	Seven comparisons . . .	3 54 39.60	. . . . . .	—6 0.37	— 23.644
	Correction of chronometer	— 54.20	. . . .		—6′ 3″.44
			Δ ρ	0.00	— 0″.11
		h. m. s.		m. s.	Rev.
Mars N. P. —B. Z. 523.15 . .	Seven comparisons . . .	4 1 16.39	. . . . . .	—6 1.73	— 22.638
	Correction of chronometer	— 54.20	. . . .		—5′ 47″.98
			Δ ρ	0.00	— 0″.10

JANUARY 12, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	B. Z. . . . 396.4	0.8	14.0	28.1	2 38 14.30	2 35.931	+6 30.05	+5.012	29.950	75.0		41.5
2	Mars . . . S.P. .	30.8	46.1	57.9	2 44 44.35	2 30.919						
3	B. Z. . . . 396.4	50.0	4.2	17.9	2 46 4.03	2 35.856						
4	Mars . . . N.P. .	20.0	35.1	47.0	2 52 33.50	2 29.919						
5	B. Z. . . . 396.4	3.2	17.1	31.0	2 54 17.10	2 36.080	6 29.30	4.900				
6	Mars . . . S.P. .	33.1	48.1	59.7	3 0 46.40	2 31.180						
7	B. Z. . . . 396.4	28.7	42.0	55.7	3 2 42.13	2 36.062						
8	Mars . . . N.P. .	. .	12.5	24.2	3 9 10.79	2 29.872						
9	B. Z. . . . 396.4	54.2	8.0	21.2	3 11 7.80	2 36.061	6 28.20	4.840				
10	Mars . . . S.P. .	22.0	38.1	50.0	3 17 36.00	2 31.221						
11	B. Z. . . . 396.4	54.0	7.0	20.8	3 21 7.27	2 36.189	6 28 28	4.831				
12	Mars . . . S.P. .	22.1	37.1	49.0	3 27 35.55	2 31.358						
13	B. Z. . . . 396.4	26.3	40.0	53.8	3 30 40.03	2 36.181						
14	Mars . . . N.P. .	53.9	9.1	21.3	3 37 7.60	2 30.333						
15	B. Z. . . . 396.4	9.2	22.3	36.2	3 39 22.57	2 36.225	6 27.33	4.966				
16	Mars . . . S.P. .	35.8	51.0	4.0	3 45 49.90	2 31.259						
17	B. Z. . . . 396.4	44.2	57.9	11.2	3 47 57.76	2 36.340						
18	Mars . . . N.P. .	12.9	27.9	39.8	3 54 26.35	2 30.449						
19	B. Z. . . . 396.4	43.5	57.7	11.0	3 56 57.40	2 36.468	6 27.65	4.766				
20	Mars . . . S.P. .	11.2	26.2	38.9	4 3 25.05	2 31.702						
21	B. Z. . . . 396.4	34.2	48.3	2.0	4 5 48.17	2 36.407						
22	Mars . . . N.P. .	1.8	16.9	29.0	4 12 15.40	2 30.629						
23	B. Z. . . . 396.4	41.2	55.2	8.7	4 13 55.03	2 36.411	6 27.07	4.621				
24	Mars . . . S.P. .	8.2	23.5	36.0	4 20 22.10	2 31.790						
25	B. Z. . . . 396.4	47.4	1.3	15.3	4 23 1.33	2 35.730						
26	Mars . . . N.P. .	14.8	30.2	42.3	4 29 28.55	2 29.839						
27	B. Z. . . . 396.4	2.5	16.0	29.7	4 42 16.07	2 35.635	+6 26.58	+4.676				
28	Mars . . . S.P. .	29.1	43.5	56.2	4 48 42.65	2 30.959						

Remarks.

Planet blurred. Interrupted by clouds, continuing the rest of the night. A 8.

Results.

		Mean of chronometer time.		Mars — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Mars S. P. —B. Z. 396.4 . .	Eight comparisons . . .	3 40 55.25	. . . .	+ 6 28.06	+ 4.701
	Correction of chronometer	— 45.67	. . . .		+ 1′ 12″.26
			Δ ρ	0.00	+ 0″.02
		h. m. s.		m. s.	Rev.
Mars N. P. —B. Z. 396.4 . .	Six comparisons	3 42 30.36	. . . .	+ 6 28.12	+ 5.906
	Correction of chronometer	— 45.67	. . . .		+ 1′ 30″.78
			Δ ρ	0.00	+ 0″.03

JANUARY 14, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	B. Z. . . . 396.4	0.3	12.7	27.1	4 10 13.37	2 35.009	+5 16.23	—3.432	30.320	69.0	33.0	19.0
2	Mars . . . S.P. .	16.2	31.4	43.0	4 15 29.60	2 38.441						
3	B. Z. . . . 396.4	26.4	40.5	54.3	4 17 40.40	2 34.611	5 15.25	2.310				
4	Mars . . N.P. .	42.3	58.0	9.0	4 22 55.65	2 36.921						
5	B. Z. . . . 396.4	12.1	26.0	40.0	4 32 26.03	2 27.066	5 15.52	3.723				
6	Mars . . . S.P. .	27 9	43.1	55.2	4 37 41.55	2 30.789						
7	B. Z. . . . 396.4	26.2	39.2	53.5	4 40 39.63	2 26.890	+5 14.97	—2.349				
8	Mars . . . N.P. .	41.2	57.2	8.0	4 45 54.60	2 29.239						

Remarks.

Night very unfavorable. A 6.

Results.

		Mean of chronometer time.		Mars — ⋆ Δ α.	Δ δ
		h. m. s.		m. s.	Rev.
Mars S. P. —B. Z. 396.4 . .	Two comparisons . . .	4 26 35 37	. . . .	+ 5 15.87	— 3.577
	Correction of chronometer	— 37.94	. . . .		—0′ 54″.98
			Δ ρ	0.00	— 0″.02
		h. m. s.		m. s.	Rev.
Mars N. P. —B. Z. 396.4 . .	Two comparisons . . .	4 34 25.12	. . . .	+ 5 15.11	— 2.329
	Correction of chronometer	— 37.93	. . . .		—0′ 35″.80
			Δ ρ	0.00	— 0″.01

JANUARY 19, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . N.P. .	9.3	. .	37.0	2 49 23.15	1 40.676	—4 0.80	+20.113	30.26	77.0		30.0
2	B. Z. . . . 405.6 .	10.0	24.3	37.5	2 53 23.93	2 30.638	4 0.80					
3	Mars . . . S.P. .	33.0	48.2	0.0	2 55 46.50	1 42.018						
4	B. Z. . . . 405.6 .	33.0	47.0	. .	2 59 47.00	2 30.428	—4 0.50	+18.561				

Remarks.

Floating clouds. Star of comparison scarcely visible. A 7.

JANUARY 22, 1850.

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . .	S.P. .	29.2	44.8	56.7	3 0 42.95	2 37.022			30.10	73.0		36.0
2	B. Z. . . .	405.6 .	. .	9.5	23.4	3 5 9.45	2 46.031	—4 26.50	+ 9.009				
3	Mars . . .	N.P. .	56.8	12.3	24.1	3 7 10.45	2 35.890						
4	B. Z. . . .	405.6 .	22.2	37.5	. .	3 11 37.45	.940 2 46.015 .980	4 27.00	10.088				
5	Mars . . .	S.P. .	53.0	8.2	20.6	3 13 6.80	2 36.870						
6	B. Z. . . .	405.6 .	19.0	33.0	47.0	3 17 33.00	2 46.001	4 26.20	9.131				
7	Mars . . .	N.P. .	13.2	28.5	41.1	3 19 27.15	2 36.020						
8	B. Z. . . .	405.6 .	. .	53.0	7.2	3 23 52.95	.838 2 46.001 .920	4 25.80	9.900				
9	Mars . . .	S.P. .	39.8	54.4	7.0	3 25 53.40	2 36.892						
10	B. Z. . . .	405.6 .	6.0	19.7	33.2	3 30 19.63	2 45.921	4 26.23	9.029				
11	Mars . . .	N.P. .	58.0	13.3	25.5	3 32 11.75	2 35.960						
12	B. Z. . . .	405.6 .	24.2	38.2	52.0	3 36 38.13	2 45.973	4 26.38	10.013				
13	Mars . . .	S.P. .	0.0	14.8	27.0	3 38 13.50	2 37.032						
14	B. Z. . . .	405.6 .	26.1	40.2	. .	3 42 40.10	2 46.060	4 26.60	9.030				
15	Mars . . .	S.P. .	57.7	12.9	25.1	3 44 11.40	2 37.002						
16	B. Z. . . .	405.6 .	24.0	38.0	. .	3 48 37.90	2 46.009	4 26.50	9.007				
17	Mars . . .	N.P. .	28.2	43.3	55.2	3 50 41.70	2 36.038						
18	B. Z. . . .	405.6 .	54.2	8.2	. .	3 55 8.10	2 46.039	4 26.40	10.001				
19	Mars . . .	S.P. .	52.0	7.0	19.0	3 57 5.50	2 37.199						
20	B. Z. . . .	405.6 .	19.2	33.0	. .	4 1 32.90	2 46.149	4 27.40	8.950				
21	Mars . . .	N.P. .	26.5	41.2	54.1	4 3 40.30	2 36.091						
22	B. Z. . . .	405.6 .	53.0	6.0	. .	4 8 5.90	2 46.120	4 25.60	10.029				
23	Mars . . .	S.P. .	36.1	51.3	3.5	4 16 49.80	2 36 908						
24	B. Z. . . .	405.6 .	2.5	16.2	. .	4 21 16.10	2 45.865	4 26.30	8.957				
25	Mars . . .	N.P. .	47.2	2.3	15.0	4 23 1.10	2 36.059						
26	B Z. . . .	405.6 .	14.1	28.1	41.3	4 27 27.83	2 45.867	4 26.73	9.808				
27	Mars . . .	S.P. .	47.1	1.5	15.0	4 30 1.05	2 36.771						
28	B. Z. . . .	405.6 .	14.1	28.3	41.5	4 34 27.96	2 45.699	4 26.91	8.928				
29	Mars . . .	N.P. .	13.7	28.9	41.3	4 37 27.50	2 35.916						
30	B. Z. . . .	405.6 .	40.0	54.1	7.5	4 42 53.86	2 46.221	4 26.36	10.305				
31	Mars . . .	S.P. .	27.1	42.3	54.2	4 44 40.65	2 36.900						
32	B. Z. . . .	405.6 .	53.0	7.2	21.0	4 49 7.06	2 45.710	4 26.41	8.810				
33	Mars . . .	N.P. .	11.2	25.2	38.1	4 51 24.65	2 35.776						
34	B. Z. . . .	405.6 .	37.2	51.0	5.0	4 55 51.06	2 45.616	4 26.41	9.840				
35	Mars . . .	N.P. .	31.0	46.2	59.0	5 35 45.00	2 42.701						
36	B. Z. . . .	405.6 .	56.5	11.0	24.0	5 40 10.50	2 52.400	4 25.50	9.699				
37	Mars . . .	N.P. .	30.4	45.3	56.5	5 43 43.45	2 42.780						
38	B. Z. . . .	405.6 .	56.5	10.5	23.5	5 48 10.16	2 52.038	4 26.71	9.258				
39	Mars . . .	S.P. .	1.8	17.2	28.9	5 51 15.35	2 43.971						
40	B. Z. . . .	405.6 .	37.6	51.0	5.0	5 55 51.20	2 52.650	4 25.85	8.679				
41	Mars . . .	S.P. .	25.0	40.3	53.0	6 3 39.00	2 43.892						
42	B. Z. . . .	405.6 .	52.0	6.2	19.2	6 8 5.80	2 52.598	—4 26.80	+8.636				

JANUARY 22, 1850—Continued.

Results.

		Mean of chronometer times.	Mars — ⁎ $\Delta\alpha$.	$\Delta\delta$.
		h. m. s.	m. s.	Rev.
Mars S. P. —B. Z. 405.6 . .	Eleven comparisons . .	4 13 11.25	. . . . . . —4 26.52	+ 8.924
	Correction of chronometer	—21.22	. . . .	+2′ 17″.17
			$\Delta\rho$ 0.00	+ 0″.04
		h. m. s.	m. s.	Rev.
Mars N. P. —B. Z. 405.6 . .	Ten comparisons . . .	4 18 27.31	. . . . . . —4 26.29	+ 9.894
	Correction of chronometer	—21.22	. . . .	+2′ 32″.08
			$\Delta\rho$ 0.00	+ 0″.04

JANUARY 29, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. $\Delta\alpha$.	$\Delta\delta$.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	58.1	13.1	25.7	3 2 11.90	2 34.398			30.400	73.0		
2	B. Z. . . . 405.6 .	26.2	40.3	53.7	3 5 40.07	2 26.809	—3 28.17	—7.589				
3	Mars . . . N.P. .	28.1	43.0	55.0	3 8 41.55	2 33.328						
4	B. Z. . . . 405.6 .	56.1	10.0	24.0	3 12 10.03	2 26.758 .595	3 28.48	6.652				
5	Mars . . . S.P. .	20.0	35.3	48.2	3 14 34.10	2 34.292						
6	B. Z. . . . 405.6 .	48.5	2.1	16.1	3 18 2.23	.692 2 26.699 .701	3 28.13	7 595				
7	Mars . . . N.P. .	26.1	41.0	53.2	3 19 39.65	2 33.367						
8	B. Z. . . . 405.6 .	54.1	. .	21.0	3 23 7.55	.630 2 26.575 .599	3 27.90	6.766				
9	Mars . . . S.P. .	41.2	56.0	7.9	3 25 54.55	2 34.768						
10	B. Z. . . . 405.6 .	. .	22.0	. .	3 29 22.00	.743 2 26.648 .578	3 27.45	8.112				
11	Mars . . . N.P. .	8.0	23.3	35.5	3 32 21.75	2 33.149						
12	B. Z. . . . 405.6 .	36.0	51.0	. .	3 35 51.00	.538 2 26.640 .639	—3 29.25	—6.543				
13	Mars . . . S.P. .	42.9	57.79	10.08	3 56 56.49	2 30.010						
14	B. Z. . . . 405.6 .	10.9	24.88	38.45	4 00 24.74	2 22.501						
15	Mars . . . N.P. .	17.95	33.82	46.29	4 3 32.12	2 28.870						
16	B. Z. . . . 405.6 .	45.32	58.79	12.31	4 6 58.81	2 22.250						
17	Mars . . . S.P. .	49.2	4.3	16.5	4 57 2.85	2 29.425						
18	B. Z. . . . 405.6 .	. .	29.7	43.5	5 0 29.70	2 21.729						

Remarks.

The times of the last three comparisons are by chronograph. A 6.

Results.

		Mean of chronometer times.	Mars — ⁎ $\Delta\alpha$.	$\Delta\delta$.
		h. m. s.	m. s.	Rev.
Mars S.P. —B. Z. 405.6 . .	Three comparisons	3 14 13.52	. . . — 3 27.92	— 7.765
	Correction of chronometer . .	— 19.86	. . . .	—1′ 59″.36
			$\Delta\rho$	— 0″.04
		h. m. s.	m. s.	Rev.
Mars N.P. —B. Z. 405.6 . .	Three comparisons	3 20 14.31	. . . — 3 28.54	— 6.651
	Correction of chronometer . .	— 19.86	. . . .	—1′ 42″.28
			$\Delta\rho$	— 0″.03

OPPOSITION OF MARS, 1851–52.

NAVAL OBSERVATORY, WASHINGTON.

DECEMBER 17, 1851.

The planet restless and indistinct—no observations possible.

DECEMBER 23, 1851.

The difference of temperature between the exterior and interior of the dome (all the doors and windows being open) renders the stars so blurred and indistinct as to make observations impossible.

DECEMBER 26, 1851.

No certain contact with the wire could be made within half a revolution of the micrometer.

JANUARY 7, 1852.

No observations possible.

JANUARY 24, 1852.*

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δα.	Δδ.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	B. Z. . . .	344.32	5.1	19.2	32.1	9 41 18.80	1 36.698	+1 10.63	−30.142	30.380	72.0	30.0	30.0
2	Mars . . .	S.P. .	15.0	28.5	41.8	9 42 28.43	3 36.749						
3	B. Z. . . .	344.32	1.3	15.0	28.5	9 44 14.93	1 36.838	1 9.74	28.805				
4	Mars . . .	N.P. .	11.3	24.7	38.0	9 48 24.67	3 35.552						
5	B. Z. . . .	344.32	19.2	33.0	46.8	9 47 33.00	1 36.890	1 9.00	30.233				
6	Mars . . .	S.P. .	29.0	42.0	55.0	9 48 42.00	3 37.032						
7	B. Z. . . .	344.32	54.0	6.7	21.0	9 49 7.23	1 36.938	1 8.77	28.644				
8	Mars . . .	N.P. .	. .	16.0	29.0	9 50 16.00	3 35.491						
9	B. Z. . . .	344.32	55.0	8.0	22.4	10 8 8.47	1 36.982	1 7.66	29.467				
10	Mars . . .	S.P. .	3.0	16.2	29.2	10 9 16.13	3 36.358						
11	B. Z. . . .	344.32	39.2	53.0	7.2	10 10 53.13	1 36.831	1 7.64	29.452				
12	Mars . . .	S.P. .	47.0	1.0	14.3	10 12 0.77	3 36.192						
13	B. Z. . . .	344.32	52.2	5.0	19.1	10 14 5.43	1 36.946	+1 7.07	−29.543				
14	Mars . . .	S.P. .	59.0	12.5	26.0	10 15 12.50	3 36.398						

* All the comparisons at this opposition of Mars are taken with mean time chronometer 2019, Dent.

JANUARY 24, 1852—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
15	B. Z. . . . 344.32	26.2	39.2	53.2	10 16 39.53	1 36.926	+1 6.54	—28.235	30.380	72.0	30.0	30.0
16	Mars . . . N.P. .	33.0	46.2	59.0	10 17 46.07	3 35.070						
17	B. Z. . . . 344.32	46.0	59.2	13.1	10 26 59.43	1 36.882	1 5.87	29.350				
18	Mars . . . S.P. .	51.9	5.0	19.0	10 28 5.30	3 36.141						
19	B. Z. . . . 344.32	25.2	39.0	53.0	10 29 39.07	1 36.940	1 6.30	28.020				
20	Mars . . . N.P. .	32.0	45.1	59.0	10 30 45.37	3 34.869						
21	B. Z. . . . 344.32	32.0	45.2	59.1	10 32 45.43	1 37.010	1 4.40	29.313				
22	Mars . . . S.P. .	37.5	51.0	4.0	10 33 50.83	3 36.232						
23	B. Z. . . . 344.32	11.0	24.0	38.0	10 35 24.33	1 36.943	+1 5.60	—27.900				
24	Mars . . . N.P. .	16.5	29.8	43.5	10 36 29.93	3 34.752						

Remarks.

Planet indistict and blazing. A 8.

Results.

		Mean of chronometer times.		Mars — ⋆ Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Mars S. P.—B. Z. 344.32 . .	Seven comparisons . . .	10 9 56.57	. . . .	+ 1 7.47	— 29.643
	Correction of chronometer .	+ 13.53	Δ t	+ 0.19	
			. . . .		— 7′ 35″.67
			Δ ρ	0.00	— 0″.14
		h. m. s.		m. s.	Rev.
Mars N. P.—B. Z. 344.32 . .	Five comparisons	10 12 8.41	. . . .	+ 1 7.39	— 28.321
	Correction of chronometer .	+ 13.53	Δ t	+ 0.19	
			. . . .		— 7′ 15″.33
			Δ ρ	0.00	— 0″.13

JANUARY 26, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Washington . O. .	30.2	. .	57.1	9 24 43.65	4 29.762	+14.25	+21.440	30.950	75.0	44.5	36.0
2	Mars . . . . S.P.	44.5	. .	11.3	9 24 57.90	2 34.186						
3	Washington . O. .	4.2	. .	31.2	9 26 17.70	4 29.749	14.55	22.584				
4	Mars . . . . N.P.	19.2	. .	45.3	9 26 32.25	2 33.029						
5	Washington . O. .	3.7	. .	30.2	9 35 16.95	4 29.883	13.50	21.555				
6	Mars . . . . S.P.	17.2	. .	43.7	9 35 30.45	2 34.192						
7	Washington . O. .	11.4	. .	38.0	9 37 24.70	4 29.782	13.25	22.683				
8	Mars . . . . N.P.	24.7	. .	51.2	9 37 37.95	2 32.963						
9	Washington . O. .	47.2	. .	. .	9 39 0.57	4 29.928	13.48	21.774				
10	Mars . . . . S.P.	1.0	. .	27.9	9 39 14.45	2 34.018						
11	Washington . O. .	16.2	. .	. .	9 40 29.57	4 29.830	+13.28	+22.934				
12	Mars . . . . N.P.	29.7	. .	56.0	9 40 42.85	2 32.760						

JANUARY 26, 1852—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
13	Washington . O. .	58.4	. .	25.2	9 44 11.80	4 29.798	+13.30	+21.665	30.950	75.0	44.5	36.0
14	Mars . . . . S.P.	12.0	. .	38.2	9 44 25.10	2 33.997						
15	Washington . O. .	24.1	. .	51.0	9 45 37.55	4 29.738	13.05	22.932				
16	Mars . . . . N.P.	37.2	. .	4.0	9 46 50.60	2 32.670						
17	Washington . O. .	45.1	. .	11.3	9 51 58.20	4 29.768	12.50	21.754				
18	Mars . . . . S.P.	57.2	. .	24.2	9 52 10.70	2 33.878						
19	Washington . O. .	27.2	. .	54.3	9 54 40.75	4 29.760	11.90	23.024				
20	Mars . . . . N.P.	39.1	. .	6.2	9 54 52.65	2 32.600						
21	Washington . O. .	7.0	. .	34.0	9 10 20.50	4 29.895	11.45	22.244				
22	Mars . . . . S.P.	19.0	. .	44.9	9 10 31.95	2 33.520						
23	Washington . O. .	46.0	. .	13.0	9 15 59.50	4 29.987	11.07	23.650				
24	Mars . . . . N.P.	. .	. .	24.0	9 16 10.57	2 32.201						
25	Washington . O. .	19.2	. .	46.0	9 17 32.60	4 29.903	11.07	22.389				
26	Mars . . . . S.P.	. .	. .	57.1	9 17 43.67	2 33.378						
27	Washington . O. .	22.0	. .	48.3	9 19 35.15	4 30.023	9.92	23.618				
28	Mars . . . . N.P.	. .	. .	58.5	9 19 45.07	2 32.269						
29	Washington . O. .	6.0	. .	33.1	9 22 19.55	4 29.849	10.55	22.102				
30	Mars . . . . S.P.	17.2	. .	43.0	9 22 30.10	2 33.611						
31	Washington . O. .	37.0	. .	4.1	9 24 50.55	4 29.929	10.15	23.519				
32	Mars . . . . N.P.	47.2	. .	14.2	9 25 0.70	2 32.274						
33	Washington . O. .	6.5	. .	33.0	9 39 19.75	4 29.939	8.85	22.585				
34	Mars . . . . S.P.	15.2	. .	42.0	9 39 28.60	2 33.218						
35	Washington . O. .	2.3	. .	28.3	9 42 15.30	4 29.917	+8.95	+23.843				
36	Mars . . . . N.P.	11.0	. .	37.5	9 42 24.25	2 31.938						

Remarks.

Power 300. At the twenty-ninth observation the planet had become deformed and unsteady. The remaining comparisons are worthless. A 9.

Results.

		Mean of chronometer times.		Mars — ✱ Δ α	Δ δ
		h. m. s.		s.	Rev.
Mars S.P. — ✱ W. O.	Nine comparisons	9 58 30.32	. . . . .	+ 12.11	+ 21.945
	Correction of chronometer . .	+ 52.43	Δ t . .	+ 0.03	
			. . . .		+ 5′ 37″.32
			Δ ρ . . .	0.00	+ 0″.10
		h. m. s.		s.	Rev.
Mars N.P. — ✱ W. O.	Nine comparisons	10 1 6.32	. . . . .	+ 11.78	+ 23.199
	Correction of chronometer . .	+ 52.43	Δ t . .	+ 0.03	
			. . . .		+ 5′ 56″.60
			Δ . . .	0.00	+ 0″.11

JANUARY 27, 1852.

Before star of comparison could be seen, the sky became clouded.

JANUARY 30, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	*Anon.	47.1	0.3	14.0	10 37 0.47	2 33.419	+1 1.60	—3.519	29.950	74.0		35.0
2	Mars . . . . S.P.	49.1	1.9	15.2	10 38 2.07	2 36.938						
3	*Anon.	51.2	5.6	18.3	10 39 5.03	2 33.441						
4	Mars . . . . N.P.	53.0	5.9	20.0	10 40 6.30	2 35.582						
5	*Anon.	53.2	6.3	19.7	10 42 6.40	2 33.443	1 1.20	3.228				
6	Mars . . . . S.P.	54.0	7.9	20.9	10 43 7.60	2 36.671						
7	*Anon.	42.0	55.1	9.0	10 44 55.37	2 33.451						
8	Mars . . . . N.P.	43.2	57.0	10.2	10 45 56.80	2 35.479						
9	*Anon.	36.0	49.1	3.0	10 48 49.37	2 33.412	1 0.40	3.073				
10	Mars . . . . S.P.	36.5	49.4	3.4	10 49 49.77	2 36.485						
11	*Anon.	51.4	5.0	18.5	10 51 4.97	2 33.418						
12	Mars . . . . N.P.	52.8	5.9	19.1	10 52 5.93	2 35.332						
13	*Anon.	24.1	37.1	51.0	10 56 37.40	2 33.232	+1 0.23	—3.136				
14	Mars . . . . S.P.	24.1	37.8	51.0	10 57 37.63	2 36.368						
15	*Anon.	49.2	2.3	16.2	10 59 2.57	2 33.287						
16	Mars . . . . N.P.	49.0	2.0	15.9	11 0 2.45	2 35.178						

Remarks.

Observations bad and interrupted by clouds.

Results.

		Mean of chronometer times.		Mars — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Mars S. P. — * Anon. . .	Four comparisons . . .	10 47 9.27	. . . .	+1 0.86	— 3.239
	Correction of chronometer .	+53.84	Δ t	+ 0.16	
			. . . .		—49″.79
			Δ ρ	0.00	— 0″.01
		h. m. s.		m. s.	Rev.
Mars N. P. — * Anon. . .	Four comparisons . . .	10 49 32.87	. . . .	+1 0.88	— 1.994
	Correction of chronometer .	+53.84	Δ t	+ 0.16	
			. . . .		—30″.65
			Δ ρ	0.00	— 0″.01

FEBRUARY 2, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Mars . . . S.P. .	31.2	44.9	58.1	9 15 44.73	2 46.230			30.150	75.0		32.0
2	B. Z. . . . 344.19	0.2	13.7	27.0	9 17 13.63	2 46.543	—1 28.93	+0.313				
3	Mars . . . N.P. .	21.7	35.0	48.0	9 18 34.90	2 44.953						
4	B. Z. . . . 344.19	50.0	4.1	17.2	9 20 3.76	2 46.549	1 28.86	1.596				
5	Mars . . . N.P. .	11.9	25.5	39.0	9 21 25.47	2 44.895						
6	B. Z. . . . 344.19	41.0	54 1	7.5	9 22 54.20	2 46.498	—1 28.73	+1.603				

FEBRUARY 2, 1852—Continued.

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
7	Mars . . .	S.P. .	4.6	18.0	31.0	9 23 17.87	2 45.981			30.150	75.0		32.0
8	B. Z. . . .	344.19	34.0	47.7	1.0	9 24 47.56	2 46.502	—1 29.69	+0.521				
9	Mars . . .	S.P. .	6.9	20.0	33.1	9 28 20.00	2 46.100						
10	B. Z. . . .	344.19	36.0	49.0	3.0	9 29 49.33	2 46.500	1 29.33	0.400				
11	Mars . . .	N.P. .	48.1	0.9	14.7	9 31 1.23	2 44.848						
12	B. Z. . . .	344.19	17.2	31.0	44.0	9 32 30.73	2 46.578	1 29.54	1.730				
13	Mars . . .	S.P. .	35.0	48.1	2.0	9 34 48.37	2 45.968						
14	B. Z. . . .	344.19	5.0	18.0	32.0	9 36 18.33	2 46.583	1 29.96	0.615				
15	Mars . . .	N.P. .	20.9	34.0	47.0	9 37 33.97	2 44.761						
16	B. Z. . . .	344.19	51.0	4.0	18.0	9 39 4.33	2 46.587	1 30.36	1.826				
17	Mars . . .	S. P. .	3.9	17.0	31.0	9 54 17.30	2 45.655						
18	B. Z. . . .	344.19	35.0	48.2	2.0	9 55 48.40	2 46.550	1 31.10	0.895				
19	Mars . . .	N.P. .	51.5	5.0	18.5	9 57 5.00	2 44.370						
20	B. Z. . . .	344.19	. .	36.5	49.7	9 58 36.35	2 46.500	1 31.35	2.130				
21	Mars . . .	S.P. .	32.9	46.0	59.0	9 59 45.97	2 45.550						
22	B. Z. . . .	344.19	4.1	18.0	31.0	10 01 17.70	2 46.480	1 31.73	0.930				
23	Mars . . .	N.P. .	27.0	40.5	54.0	10 2 40.50	2 44.256						
24	B. Z. . . .	344.19	59.0	12.5	26.0	10 4 12.50	2 46.470	1 32.00	2.214				
25	Mars . . .	S.P. .	33.9	47.0	1.0	10 5 47.30	2 45.411						
26	B. Z. . . .	344.19	7.0	20.0	33.0	10 7 20.00	2 46.468	1 32.70	1.057				
27	Mars . . .	N.P. .	15.0	28.9	42.5	10 8 28.80	2 44.201						
28	B. Z. . . .	344.19	48.0	1.0	15.0	10 10 1.33	2 46.480	1 32.53	2 279				
29	Mars . . .	S.P. .	27.2	39.7	53.0	10 11 39.97	2 45.241						
30	B. Z. . . .	344.19	59.0	12.0	26.0	10 13 12.33	2 46.342	1 32.36	1.101				
31	Mars . . .	N.P. .	55.5	8.7	22.0	10 15 8.73	2 44.046						
32	B. Z. . . .	344 19	28.0	41.0	55.0	10 16 41.33	2 46.419	—1 32.60	+2.365				

Remarks.

Towards end of observations planet becomes blurred and uncertain. A 8.

Results.

		Mean of chronometer times.		Mars — ✱ Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Mars S. P. — B. Z. 344.19 . .	Eight comparisons	9 45 43.41	. . . .	—1 30.72	+ 0.729
	Correction of chronometer .	+ 55.57	Δ t	— 0.25	
			. . . .		+11″.20
			Δ ρ	0.00	0″.00
		h. m. s.		m. s.	Rev.
Mars N. P. — B. Z. 344.19 . .	Eight comparisons	9 46 29.84	. . . .	—1 30.75	+ 1.968
	Correction of chronometer .	+ 55.57	Δ t	— 0.25	
			. . . .		+ 30″.25
			Δ ρ	0.00	0″.00

FEBRUARY 3, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	B. A. C. . . 2789 .	38.2	51.2	5.2	9 6 51.53	3 32.929	+1 23.80	+0.887	30.150	78.0		30.5
2	Mars . . . S.P. .	2.0	15.0	29.0	9 8 15.33	3 32.042						
3	B. A. C. . . 2789 .	21.2	34 2	47.5	9 9 31.30	3 32.818	1 23.53	2.038				
4	Mars . . . N.P. .	44.5	58.0	11.0	9 10 57.83	3 30.780						
5	B. A. C. . . 2789 .	52.0	5.2	19.2	9 15 5.47	3 32.762	1 23.53	0.757				
6	Mars . . . S.P. .	16.0	29.0	42.0	9 16 29.00	3 32.005						
7	B. A. C. . . 2789 .	25.1	38.3	52.0	9 17 38.47	3 32.865	1 22.60	2.191				
8	Mars . . . N.P. .	47.9	1.0	14.3	9 19 1.07	3 30.674						
9	B. A. C. . . 2789 .	14.3	28.0	41.0	9 24 27.77	3 32.782	1 22.50	1.152				
10	Mars . . . S.P. .	37.0	49.8	4.0	9 25 50.27	3 31.650						
11	B. A. C. . . 2789 .	53.0	6.6	19.8	9 27 6.47	3 32.712	1 22.20	2.247				
12	Mars . . . N.P. .	15.0	29.0	42.0	9 28 28.67	3 30.465						
13	B. A. C. . . 2789 .	21.2	35.0	48.0	9 30 34.73	3 32.705	1 22.57	1.102				
14	Mars . . . S.P. .	44.0	57.0	10.9	9 31 57.30	3 31.603						
15	B. A. C. . . 2789 .	56.0	10.2	23.0	9 33 9.73	3 32.771	1 21.54	2.419				
16	Mars . . . N.P. .	18.0	31.0	44.8	9 34 31.27	3 30.352						
17	B. A. C. . . 2789 .	8.0	21.0	35.0	9 51 21.33	3 32.599	1 20.34	1.307				
18	Mars . . . S.P. .	28.0	42.0	55.0	9 52 41.67	3 31.292						
19	B. A. C. . . 2789 .	31.9	45.7	59.2	9 55 45.60	3 32.585	1 20.07	2.595				
20	Mars . . . N.P. .	52.0	6.0	19.0	9 57 5.67	3 29.990						
21	B. A. C. . 2789 .	4.0	17.3	30.0	9 59 17.10	3 32.535	1 19.87	1.314				
22	Mars . . . S.P. .	23 9	37.0	50 0	10 0 36.97	3 31.221						
23	B. A. C. . . 2789 .	50.2	3.6	17.2	10 2 3.87	3 32.513	1 19.46	2.683				
24	Mars . . . N P. .	10.0	23.0	37.0	10 3 23.33	3 29.830						
25	B. A. C. . . 2789 .	26.3	40.0	53.6	10 4 39.96	3 32.518	1 19.71	1.518				
26	Mars . . . S.P. .	46.3	59.7	13.0	10 5 59.67	3 31.000						
27	B. A. C. . . 2789 .	7.2	20.6	34.3	10 7 20.70	3 32.462	1 19.30	2.692				
28	Mars . . . N.P.	27.0	40.0	53.0	10 8 40.00	3 29.770						
29	B. A. C. . . 2789 .	17.9	31.0	44.6	10 10 31.16	3 32.495	1 19.61	1.437				
30	Mars . . . S.P. .	37.3	51.0	4.0	10 11 50.77	3 31.058						
31	B. A. C. . . 2789 .	52.1	5.7	19.3	10 13 5.70	3 32.513	1 18.63	2.804				
32	Mars . . . N.P. .	11.0	25.0	38 0	10 14 24.33	3 29.709						
33	B. A. C. . . 2789 .	49.2	3.0	16.2	10 24 2.80	3 32.422	1 18.50	1.722				
34	Mars . . . S.P. .	8.0	20.9	35.0	10 25 21.30	3 30 700						
35	B. A. C. . . 2789 .	22.0	35.0	49.0	10 26 35.33	3 32.441	+1 18.67	+2.911				
36	Mars . . . N P. .	40.0	54.0	8.0	10 27 54.00	3 29.530						
37	Mars . . . S.P. .	18.0	. .	45.0	10 30 31.50	3 30.592						
38	Mars . . . N. .	. . .	. .	. .	. . . . .	3 28.530						
39	* 8.9	26.0	. .	52.0	10 30 39.00	3 31.195						

Remarks.

Planet much deformed. At commencement of observation a star of 8.9 magnitude just emerging from edge of planet. This star compared at end of the series. A 8.

FEBRUARY 3, 1852—Continued.

Results.

		Mean of chronometer times.		Mars — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Mars S. P. —B. A. C. 2789 . .	Nine comparisons . . .	9 46 33.59	. . . .	+ 1 21.16	+ 1.244
	Correction of chronometer	+ 57.18	Δ t	+ 0.22	
			. . . .		+ 19″.12
			Δ ρ		+ 0″.01
		h. m. s.		m. s.	Rev.
Mars N. P. —B. A. C. 2789 . .	Nine comparisons . . .	9 49 32.91	. . . .	+ 1 20.67	+ 2.509
	Correction of chronometer	+ 57.18	Δ t	+ 0.22	
			. . . .		+ 38″.57
			Δ ρ		+ 0″.01

FEBRUARY 17, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	B. Z. . . . 341.91	43.1	59.0	15.0	9 3 59.03	2 43.238	+45.97	+4.164	30.050	74.0		28.0
2	Mars . . . S.P. .	29.0	45.0	1.0	9 4 45.00	2 39.074						
3	B. Z. . . . 341.91	53.5	9.2	25.2	9 6 9.30	2 43.261	+46.80	+5.639				
4	Mars . . . N.P. .	. .	56.0	12.0	9 7 56.10	2 37.622						

Remarks.

Planet in a blaze, and uncertain; observations impossible. A 9.

FEBRUARY 25, 1852.

North pole of Mars presented a singular ring-like appearance, as if there were an elevated band in that part of the planet. Other observations prevented. A 9.

FEBRUARY 29, 1852.

Observations for position impossible. The appearance noted on the 25th scarcely discernible. A 9.

INFERIOR CONJUNCTIONS OF VENUS, 1850-52.

MICROMETRICAL OBSERVATIONS,

WITH

THE 14 FEET EQUATORIAL,

AT

THE NAVAL OBSERVATORY, WASHINGTON.

INFERIOR CONJUNCTION OF VENUS:

1850–51.

OCTOBER 19, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P.	9.5	23.4	37.2	6 3 23.36	. . .					59.2	50.5
2	*	. .	13.2	27.1	6 4 10.21	2 28.280						
3	Venus . . . S.P.	18.7	32.4	46.2	6 6 32.43	2 46.345						
4	*	7.1	20.9	35.3	6 7 21.10	2 30.805	—48.67	—15.540				
5	Venus . . . N.P.	49.2	3.2	17.1	6 10 3.16	2 48.421						
6	*	. .	51.3	5.3	6 10 51.31	2 30.062	48.15	18.359				
7	Venus . . . S.P.	22.9	36.2	50.0	6 12 36.36	2 45.274						
8	*	10.3	24.2	38.0	6 13 24.16	2 29.501	47.80	15.773				
9	Venus . . . N.P.	36 0	49.7	3.9	6 15 49.86	2 47.522						
10	*	. .	38.2	51.7	6 16 38.36	2 29.086	48.50	18.436				
11	Venus . . . S.P.	52.3	6.5	20.5	6 17 6.43	2 44.479						
12	*	39.2	53.1	6.8	6 18 53.03	2 28.548	46.60	15.931				
13	Venus . . . N.P.	36.0	49.8	4.1	6 21 49.96	2 46.140						
14	*	. .	36.3	50.5	6 22 36.41	2 27.552	46.45	18.588				
15	Venus . . . S.P.	2.1	16.0	29.5	6 24 15.86	2 42.897						
16	*	. .	2.0	15.4	6 25 1.81	2 26.651	—45.95	—16.246				

Remarks.

Planet undefined. **A** 5.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		s.	Rev.
Venus S. P. — *	Four comparisons	6 15 7.77	. . . . . .	— 47.25	— 15.872
	Correction of chronometer . . .	+ 35.56	Δ t . . .	— 0.13	
			. . . .		— 4′ 3″.97
			Δ ρ . . .	— 0.08	— 1″.64
		h. m. s.		s.	Rev.
Venus N. P. — *	Three comparisons	6 15 54.32	. . . . . .	— 47.70	— 18.461
	Correction of chronometer . . .	+ 35.56	Δ t . . .	— 0.13	
			. . . .		— 4′ 43″.76
			Δ ρ . . .	— 0.09	— 1″.91

OCTOBER 21, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P.	41.3	55.0	8.7	5 54 55.00	2 37.338			29.90	72.0	55.5	49.5
2	* 9	. .	26.0	40.0	5 56 26.15	2 43.950	—1 31.15	+6.612				
3	* 8	. .	19.1	32.7	5 57 19.05	3 30.376						
4 a	Venus . . . N.P.	33.0	46.4	0.3	5 59 6.56	2 34.670						
5	* 9	23.3	37.0	51.0	6 0 37.10	2 43.300	1 30.54	8.630				
6	* 8	16.0	29.3	43.3	6 1 29.53	3 29.722						
7	Venus . . . S.P.	49.1	2.7	16.2	6 4 2.67	2 36.014						
8	* 9	18.2	32.4	46.0	6 5 32.20	2 42.452	1 29.53	6.438				
9	* 8	. .	25.5	39.0	6 6 25.25	3 28.902						
10	Venus . . . N.P.	19.2	32.8	47.2	6 8 33.06	2 32.960						
11	* 9	49.0	3.0	16.2	6 10 2.73	2 41.791	1 29.67	8.831				
12	* 8	42.1	55.8	9.2	6 11 55.70	3 27.950						
13	Venus . . . S.P.	29.1	43.2	57.2	6 12 43.16	2 33.753						
14	* 9	58.0	12.5	26.0	6 14 12.16	2 39.771	1 29.00	6.018				
15	* 8	51.3	5.0	19.1	6 15 5.13	3 27.140						
16	Venus . . . N.P.	28.2	42.1	56.2	6 16 42.16	2 31.500						
17	* 9	55.9	10.0	24.5	6 18 10.13	2 40.000	1 27.97	8.500				
18	* 8	49.6	3.2	17.0	6 19 3.26	3 26.296						
19	Venus . . . S.P.	10.3	24.2	38.1	6 21 24.20	2 32.841						
20	* 9	. .	51.0	5.0	6 22 51.05	2 38.565	1 26.85	5.724				
21	* 8	. .	45.0	58.0	6 23 44.55	3 24.918						
22	Venus . . . N.P.	0.4	14.1	28.2	6 26 14.23	2 29.000						
23	* 9	27.1	41.2	55.0	6 27 41.10	2 36.915	—1 26.87	+7.915				
24	* 8	. .	33.4	47.5	6 28 33.45	3 23.472						

Remarks.

Stars dim, and planet undefined and blurred. A 6.

a The recorded reading here is corrected in the mean, it being evidently forty seconds too large.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Venus S. P. — *	Four comparisons	6 9 45.39	. . . .	— 1 29.13	+ 6.132
	Correction of chronometer .	+ 29.46	Δ *t*	— 0.24	
			. . . .		+ 1′ 34″.26
			Δ ρ	+ 0.03	+ 0″.59
		h. m. s.		m. s.	Rev.
Venus N. P. — *	Four comparisons	6 12 39.00	. . . .	— 1 28.76	+ 8.469
	Correction of chronometer .	+ 29.46	Δ *t*	— 0.24	
			. . . .		+ 2′ 10″.18
			Δ ρ	+ 0.04	+ 0″.81

OCTOBER 22, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Venus . . . N.P.	22.9	36.9	50 9	5 44 36.90	2 41.029			29.964	75.0	63.0	62.0
2	*	. . .	. .	26.5	5 45 12.58	2 52.419	—35.68	+11.390				

OCTOBER 22, 1850—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
3	Venus . . . S.P.	22.1	35.9	49.8	5 48 35.93	2 43.010			29.964	75.0	63.0	62.0
4	*	. .	. .	25.0	5 49 11.08	2 51.985	—35.15	+8.975				
5	Venus . . . N.P.	26.3	. .	54.1	5 51 40.20	2 40.391						
6	*	. .	. .	29.1	5 52 15.18	2 51.582	34.98	11.191				
7	Venus . . . S.P.	59.5	12.9	27.5	5 54 13.30	2 42.311						
8	*	. .	. .	3.0	5 54 49.08	2 51.407	35.78	9.096				
9	Venus . . . N.P.	35.1	49.5	4.0	5 57 49.87	2 39.629						
10	*	. .	23.1	37.2	5 58 23.27	2 50.779	33.40	11.150				
11	Venus . . . S P.	45.2	59.0	12.9	5 59 59.03	2 41.619						
12	*	. .	. .	45.5	6 0 31.58	2 50.499	32.55	8.880				
13	Venus . . . N.P.	12.5	26.2	39.7	6 2 26.13	2 39.104						
14	*	. .	59.1	12.4	6 2 58.93	2 50.058	32.80	10.954				
15	Venus . . . S.P.	12.0	26.1	39.7	6 4 25.93	2 41.052						
16	*	. .	. .	12.0	6 4 58.08	2 49.808	32.15	8.756				
17	Venus . . . N.P.	24.0	37.9	52.0	6 6 37.97	2 38.300						
18	*	. .	. .	24.0	6 7 10.08	2 49.289	—32.11	+11.989				

Remarks.

The night tolerable. The temperatures on the outside and inside of the dome nearly equal, being 62° 63′. Still the disc of the planet tremulous, and not measureable within ten seconds. A 7.

Results.

		Mean of chronometer times.	Venus — * Δ α	Δ δ
		h. m. s.	s.	Rev.
Venus S. P. — *	Four comparisons	5 57 9.72	. . . . . — 33.91	+ 8.927
	Correction of chronometer .	+ 29.38	Δt . . — 0.09	
			. . . .	+ 2′ 17″.26
			Δρ . . + 0.02	+ 0″.40
		h. m. s.	s.	Rev.
Venus N. P. — *	Five comparisons	5 56 38.21	. . . . . — 33.79	+ 11.315
	Correction of chronometer .	+ 29.38	Δt . . — 0.09	
			. . . .	+ 2′ 53″.92
			Δρ . . + 0.03	+ 0″.51

OCTOBER 28, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P.	4.1	18.0	32.1	5 50 18.07	2 35.835			30.100	70.0	67.5	55.0
2	*	. .	46.1	0.0	5 50 46.07	1 42.298	—28.00	—23.484				
3	Venus . . . N.P.	22.0	36.1	49.5	5 53 35.87	2 33.083						
4	*	.	4.5	18.1	5 54 4.37	1 42.039	—28.50	—20.991				

OCTOBER 28, 1850—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
5	Venus . . . S.P.	15.9	30.0	. .	5 56 29.96	2 35.178			30.100	70.0	67.5	55.0
6	*	. .	. .	2.5	5 56 48.71	1 41.652	—28.75	—23.473				
7	Venus . . . N.P.	32.9	47.0	0.9	5 58 46.93	2 32.469						
8	*	. .	. .	28.2	5 59 14.41	2 41.310	27.48	21.106				
9	Venus . . . S.P.	6 2	2.0	34.0	6 1 20.07	2 34.340						
10	*	. .	. .	1.0	6 1 47.21	1 40 962	27.14	23.325				
11	Venus . . . N.P.	52.0	6.0	19.2	6 3 5.73	2 31.678						
12	*	. .	. .	46.5	6 3 32.71	1 40.419	—26.98	—21.206				

Remarks.

Night clear and serene. Observations unsatisfactory. A 8.

Results.

		Mean of chronometer times.		Venus — * Δ α	Δ δ
		h. m. s.		s.	Rev.
Venus S. P. — *	Three comparisons	5 56 27.33	. . . . .	— 27.96	— 23.427
	Correction of chronometer .	+ 23.98	Δ t . . .	— 0.08	
			. . . .		— 6′ 0′.11
			Δ ρ . . .	— 0.12	— 2″.11
		h. m. s.		s.	Rev.
Venus N. P. — *	Three comparisons	5 58 29.51	. . . . .	— 27.65	— 21.101
	Correction of chronometer .	+ 23.98	Δ t . . .	— 0.08	
			. . . .		— 5′ 24″.25
			Δ ρ . . .	— 0.09	— 1″.90

OCTOBER 29, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P.	. .	51.0	. .	5 54 50.82	3 33.662			30.210	70.0	55.0	49.0
2	* 8	. .	15.0	. .	5 55 14.82	1 37.391	—24.00	+56.360				
3	Venus . . . S.P.	7.0	21.0	. .	5 57 20.82	3 33.552						
4	* 8	. .	. .	59.0	5 57 45.16	1 36.822	24.34	56.819				
5	Venus . . . N.P.	48.2	2.0	. .	5 59 1.82	3 30.488						
6	* 8	. .	. .	40.0	5 59 26.16	1 33.502	—24.31	+54.075				
7	* 9	1.5	16.2	29.7	6 2 15.80	2 46.030	+57.13	—15.906				
8	Venus . . . S.P.	59.0	12.9	26.9	6 3 12.93	3 31.969						
9	* 9	45.0	59.0	12.5	6 4 58.83	2 45.469	+57.95	—13.428				
10	Venus . . . N.P.	42.9	.	. .	6 5 56.78	3 28.950						

Remarks.

Observations unsatisfactory. A 8.

NOVEMBER 1, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P.	47.1	1.0	15.2	5 28 1.10	2 33.199			30.210	70.0	62.0	59.0
2	Lacaille . . . 7371	33.1	47.0	1.3	5 30 47.13	2 51.562	—2 46.03	+18.363				
3	Venus . . . N.P.	38.3	52.5	7.0	5 32 52.60	2 30.160						
4	Lacaille . . . 7371	23.5	38.3	52.1	5 35 37.96	2 50.945	2 45.36	20.785				
5	Venus . . . S.P.	17.2	31.0	45.0	5 40 31.06	2 32.042						
6	Lacaille . . . 7371	1.3	15.5	29.7	5 43 15.50	2 50.375	2 44.44	18.333				
7	Venus . . . N.P.	56.9	. .	25.0	5 46 10.95	2 28.975						
8	Lacaille . . . 7371	40.7	55.0	8.9	5 48 54.53	2 49.862	2 43.58	20.887				
9	Venus . . . S.P.	24.2	37.9	52 2	5 50 38.10	2 30.649						
10	Lacaille . . . 7371	. .	21.7	35.5	5 53 21.65	2 48.838	2 43.55	18.189				
11	Venus . . . N.P.	48.7	. .	16.8	5 55 2.75	2 27.247						
12	Lacaille . . . 7371	31.9	45.9	59.7	5 57 45.83	2 48.077	2 43.08	20.830				
13	Venus . . . S.P.	13.0	27.1	41.0	6 0 27.03	1 58.858						
14	Lacaille . . . 7371	55.0	9.0	23.0	6 3 9.00	2 46.937	2 41.97	18.221				
15	Venus . . . N.P.	13.1	27.1	41.0	6 5 27.03	1 55.219						
16	Lacaille . . . 7371	55.0	9.0	23.0	6 8 9.00	2 45.640	—2 41.94	+20.563				

Remarks.

Brown haze. A 8.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Venus S. P. — Lacaille 7371 . . .	Four comparisons	5 44 54.32	. . . .	— 2 43.99	+ 18.276
	Correction of chronometer .	+ 21.72	Δ t .	— 0.45	
			. . . .		+ 4′ 40″.92
			Δ ρ .	+ 0.07	+ 1″.37
		h. m. s.		m. s.	Rev.
Venus N. P. — Lacaille 7371 . . .	Four comparisons	5 49 53.34	. . . .	— 2 43.49	+ 20.766
	Correction of chronometer .	+ 21.72	Δ t .	— 0.45	
			. . . .		+ 5′ 19″.21
			Δ ρ .	+ 0.08	+ 1″.57

NOVEMBER 2, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Lacaille . . . 7371	. .	. .	. .	. . . . .	2 39.061	. . .	+8.669	30.225	69.0	59.8	61.0
2	Venus . . . S.P.	. .	20.0	. .	5 25 20.00	2 30.392						
3	Lacaille . . . 7371	. .	. .	. .	. . . . .	2 39.000	. . .	11.621				
4	Venus . . . N.P	. .	40.0	. .	5 26 40.00	2 27.379						
5	Lacaille . . . 7371	. .	. .	. .	. . . . .	2 38.839	. . .	+9.068				
6	Venus . . . S.P.	. .	20.0	. .	5 27 20.00	2 29.771						

NOVEMBER 2, 1850—Continued.

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
7	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 38.745	. . .	+11.584	30.225	69.0	59.8	61.0
8	Venus . . .	N.P.	. .	10.0	. .	5 29 10.00	2 27.161						
9	Lacaille . . .	7371	13.2	27.0	41 3	5 30 27.16	. . .	+20.04					
10	Venus . . .	P.	33.2	47.2	1.2	5 30 47.20	. . .						
11	Lacaille . . .	7371	53.5	7.7	21.5	5 32 7.56	. . .	20.47					
12	Venus . . .	P.	14.3	27.9	41.9	5 32 28.03	. . .						
13	Lacaille . . .	7371	13.2	27.2	41.4	5 33 27.26	. . .	20.50					
14	Venus . . .	P.	33.7	47.9	1.7	5 34 47.76	. . .						
15	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 38.051	. . .	9.229				
16	Venus . . .	S.P.	. .	52.0	. .	5 38 52.00	2 28.822						
17	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 38.075	. . .	11.853				
18	Venus . . .	N.P.	. .	5.0	. .	5 40 5.00	2 26.222						
19	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 37.629	. . .	9.008				
20	Venus . . .	S.P.	. .	42.0	. .	5 41 42.00	2 28.621						
21	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 37.436	. . .	11.669				
22	Venus . . .	N.P.	. .	27.0	. .	5 42 27.00	2 25.767						
23	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 36.935	. . .	8.906				
24	Venus . . .	S.P.	. .	3.0	. .	5 46 3.00	2 28.029						
25	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 36.872	. . .	11.591				
26	Venus . . .	N.P.	. .	7.0	. .	5 47 7.00	2 25.281						
27	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 36.572	. . .	9.071				
28	Venus . . .	S.P.	. .	40.0	. .	5 48 40.00	2 27.501						
29	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 36.412	. . .	11.652				
30	Venus . . .	N.P.	. .	6.0	. .	5 50 6.00	2 24.760						
31	Lacaille . . .	7371	57.1	11.5	24.9	5 52 11.16	. . .	23.54					
32	Venus . . .	P.	20.8	34.7	48.6	5 52 34.70	. . .						
33	Lacaille . . .	7371	29.8	44.6	57.9	5 53 44.10	. . .	23.10					
34	Venus . . .	P.	53.1	7.3	21.2	5 54 7.20	. . .						
35	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 35.483	. . .	8.985				
36	Venus . . .	S.P.	. .	41.0	. .	5 55 41 00	2 26.498						
37	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 35.199	. . .	11.500				
38	Venus . . .	N.P.	. .	59.0	. .	5 56 59.00	2 23.699						
39	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 34.887	. . .	8.916				
40	Venus . . .	S P.	. .	17.0	. .	5 58 17.00	2 25.971						
41	Lacaille . . .	7371	. .	. .	. .	. . . . .	2 34.585	. . .	+11.364				
42	Venus . . .	N.P.	. .	52.0	. .	5 58 52.00	2 23.221						
43	Lacaille . . .	7371	38.5	52.7	6.2	6 1 52.47	. . .	+24.53					
44	Venus . . .	P.	2.9	17.1	31.0	6 2 17.00	. . .						

Results.

		Mean of chronometer times.		Venus — * Δ α.
		h. m. s.		s.
Venus P. — Lacaille 7371	Six comparisons	5 44 30.31	. . . .	+ 22.03
	Correction of chronometer .	+ 20.57	Δ t . .	+ 0.06
			Δ ρ . .	— 0.04

NOVEMBER 2, 1850—Continued.

Results—Continued.

		Mean of chronometer times.		Venus — * Δ δ.
		h. m. s.		Rev.
Venus S. P. — Lacaille 7371 . . .	Eight comparisons	5 41 29.38	. . . .	+ 8.981
	Correction of chronometer .	+ 20 57	. . . .	
				+ 2′ 18″.05
			Δ ρ	+ 0″.56
		h. m. s.		Rev.
Venus N. P. — Lacaille 7371 . . .	Eight comparisons	5 43 55.07	. . . .	+ 11.606
	Correction of chronometer .	+ 20.57	. . . .	
				+ 2′ 58″.40
			Δ ρ	+ 0″.84

NOVEMBER 4, 1850.

Before the instrument could be pointed at the planet the sky became hazy.

NOVEMBER 5, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.		°	°	°
1	* 9.5	56.0	. .	21.0	5 49 10.00	2 36.728	+1 52.10	+4.630				
2	Venus . . . S.P.	48.1	2.0	16.2	5 51 2.10	2 32.098						
3	* 9.5	50.2	. .	19.0	5 53 4.60	2 36.720	+1 52.67	+7.081				
4	Venus . . . N.P.	43.1	57.2	11.5	5 54 57.27	2 29.639						
5	*	. .	52.5	6.5	6 0 52.42	2 40.642						

Remarks.

Planet wavy and uncertain. A 8.

NOVEMBER 9, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	* 8	38.1	52.2	6.0	5 24 52.10	3 28.106	+1 7.85	+18.874	30.210	74.0	54.0	47.0
2	Venus . . . S.P.	45.8	. .	14.1	5 25 59.95	2 39.102						
3	* 8	2.4	15.8	30.4	5 29 16.20	3 26.778	1 8.15	21.736				
4	Venus . . . N.P.	10.7	. .	38.0	5 30 24.35	2 34.924						
5	* 8	43.3	56.9	11.0	5 35 57.06	3 26.817	1 8.14	18.665				
6	Venus . . . S.P.	50.9	5.5	19.2	5 37 5.20	2 38.022						
7	* 8	39.2	53.5	8.1	5 38 53.60	3 26.358	1 8.57	21.766				
8	Venus . . . N.P.	48.2	2.3	16.0	5 40 2.17	2 34.462						
9	* 8	12.0	26.1	39.5	5 43 25.86	3 25.589	1 9.41	18.669				
10	Venus . . . S.P.	21.3	35.5	49.0	5 44 35.27	2 36.790						
11	* 8	46.5	0.4	14.5	5 46 0.47	3 25.192	+1 9.66	+21.890				
12	Venus . . . N.P.	56.2	10.2	24.0	5 47 10.13	2 33.172						

NOVEMBER 9, 1850—Continued.

Remarks.

Planet deformed and tremulous. A 7.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Venus S. P. — * 8 . .	Three comparisons	5 35 53.47	. . . .	+1 8.47	+ 18.735
	Correction of chronometer . .	+ 14.51	Δ t	+ 0.19	
			. . . .		+ 4′ 47″.98
			Δ ρ	+ 0.07	+ 1″.42
		h. m. s.		m. s.	Rev.
Venus N. P. — * 8 . .	Three comparisons	5 39 12.22	. . . .	+1 8.79	+ 21.797
	Correction of chronometer . .	+ 14.51	Δ t	+ 0.19	
			. . . .		+ 5′ 35″.06
			Δ ρ	+ 0.08	+ 1″.66

NOVEMBER 10, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	* 8	39.6	53.1	7.5	5 1 53.40	3 31.041	+3 25.70	+25.722	30.150	71.0		41.0
2	Venus . . . S.P.	5.2	19.0	33.1	5 5 19.10	2 35.189						
3	* 8	56.0	9.7	24.1	5 7 9.93	3 30.690	3 27.00	27.765				
4	Venus . . . N.P.	22.9	37.0	50.9	5 10 36.93	2 32.795						
5	* 8	25.0	39.2	55.7	5 13 39.96	3 30.068	3 26.04	24.939				
6	Venus . . . S.P.	52.1	6.0	19.9	5 17 6.00	2 34.999						
7	* 8	49.2	. .	18.2	5 19 3.70	3 29.579	3 28.26	27.880				
8	Venus . . . N.P.	18.0	31.9	46.0	5 22 31.96	2 31.569						
9	* 8	12.1	26.2	40.3	5 30 26.20	3 28.537	3 29.70	25.079				
10	Venus . . . S.P.	41.9	55.8	10.0	5 33 55.90	2 33.328						
11	*	23.0	37.0	50.8	5 35 36.93	1 49.238						
12	Venus . . . N.P.	2.0	16.2	31.0	5 37 16.40	2 29.982						
13	*	43.1	57.2	11.0	5 38 57.10	1 48.710						
14	* 7.8	. .	59.5	14.5	5 40 0.00	1 37.809	—2 43.60	—22.392				
15	Venus . . . S.P.	28.9	42.7	56.7	5 41 42.76	2 32.050						
16	*	8.5	22.1	36.0	5 43 22.20	1 48.116						
17	* 7.8	. .	25.0	39.0	5 44 25.15	1 37.374	2 42.39	24.895				
18	Venus . . . N.P.	12.2	. .	40.0	5 46 26.10	2 28.269						
19	*	52.0	5.0	19.2	5 48 5.40	1 47.245						
20	* 7.8	. .	8.7	22.2	5 49 9.15	1 36.430	—2 43.05	—22.058				

Remarks.

The first four comparisons taken without illumination of the wires ; three are good, the rest unsatisfactory. A 9.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Venus S. P. — * 8 . .	Three comparisons . . .	5 18 47.00	. . . .	+3 27.16	+ 25.247
	Correction of chronometer .	+ 13.07	Δ t	+ 0.56	
			. . . .		+ 6′ 28″.09
			Δ ρ	+ 0.09	+ 1″.84
		h. m. s.		m. s.	Rev.
Venus N. P. — * 8 . .	Three comparisons . . .	5 16 34.44	. . . .	+3 27.63	+ 27.822
	Correction of chronometer .	+ 13.07	Δ t	+ 0.56	
			. . . .		+ 7′ 7″.66
			Δ ρ	+ 0.09	+ 1″.93

NOVEMBER 13, 1850.

No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Venus—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α	Δ δ		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	* 8	56.2	10.2	23.9	5 20 10.10	2 43.569	+1 7.90	+ 8.191	30.040	71.0	55.0	48.0
2	Venus . . . S.P.	. .	18.0	31.9	5 21 18.00	2 35.378						
3	* 8	29.1	43.2	57.0	5 22 43.10	2 43.088	1 8.23	10 935				
4	Venus . . . N.P.	37.2	50.9	5.9	5 23 51.33	2 32.153						
5	* 8	44.9	59.3	13.7	5 26 59.30	2 42.960	1 8.10	8.212				
6	Venus . . . S.P.	53.1	7.2	21.9	5 28 7.40	2 34.748						
7	* 8	54.7	8.4	22 8	5 31 8.63	2 42.400	1 8.33	11.209				
8	Venus . . . N.P.	3.0	17.0	30.9	5 32 16.96	2 31.191						
9	* 8	41.4	55.3	9.6	5 33 55.43	2 41.975	1 8.53	8.165				
10	Venus . . . S.P.	50.0	3.9	18.0	5 35 3.96	2 33.810						
11	* 8	20.0	34.2	48 6	5 36 34.26	2 41.548	1 8 77	11.212				
12	Venus . . . N.P.	29.2	43.0	56.9	5 37 43.03	2 30.336						
13	* 8	23.0	37.2	51.4	5 39 37.20	2 41.088	1 9.10	8.370				
14	Venus . . . S.P.	32.5	46.1	0.3	5 40 46.30	2 32.718						
15	* 8	51.2	6.7	19.0	5 42 5.63	2 40.502	+1 8.20	+11.140				
16	Venus . . . N.P.	59.5	14.1	27.9	5 43 13.83	2 29.358						

Remarks.

The first two comparisons without illumination. The night uncommonly fine and serene. All the circumstances favorable, except the inequality of the external and interior temperatures, which could not have been reduced, all the doors and windows of the dome having been kept open during the whole day. A 8.

Results.

	Mean of chronometer times.		Venus — * Δ α.	Δ δ.
	h. m. s.		m. s.	Rev.
Venus S. P. — * 8	5 31 18.91	. . . . . .	+1 8.41	+ 8.234
Correction of chronometer	+ 12.53	Δ t	+ 0.19	
		. . . .		+2′ 6″.57
		Δ ρ	+ 0.03	+ 0″.68
	h. m. s.		m. s.	Rev.
Venus N. P. — * 8	5 34 16.29	. . . . . .	+1 8.38	+ 11.124
Correction of chronometer	+ 12.53	Δ t	+ 0.19	
		. . . .		+2′ 50″.99
		Δ ρ	+ 0.04	+ 0″.91

NOVEMBER 14, 1850.

No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Venus—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P.	27.5	41.6	56.0	5 12 41.70	2 30.990			30.083	75.0	57.0	52.0
2	* 8	24.1	38.3	52.1	5 13 38.17	2 32.599	—56.47	+1.609				
3	Venus . . . N.P.	52.0	5.9	20.1	5 15 6.00	2 27.800						
4	* 8	48.9	3.0	17.0	5 16 2.96	2 32 300	56.96	4.500				
5	Venus . . . S.P.	24.1	38.3	52 0	5 17 38.13	2 30.388						
6	* 8	21.0	34.7	49.0	5 18 34.90	2 32.080	—56.77	+1.692				

NOVEMBER 14, 1850—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
7	Venus . . . N.P.	27.0	40.9	55.0	5 19 40.96	2 27.200			30.083	75.0	57.0	52.0
8	* 8	24.1	37 0	52.0	5 20 37.70	2 31.850	— 56.74	+4.650				
9	Venus . . . S.P.	23.1	36.9	51.0	5 29 37.00	2 28.931						
10	* 8	19.1	33.0	47.9	5 30 33.33	2 30.942	56.33	2.011				
11	Venus . . . N.P.	53.0	6.2	19.7	5 32 6.30	2 25.631						
12	* 8	48.2	2.5	16.9	5 33 2.53	2 30.522	56.23	4.891				
13	Venus . . . S.P.	49.7	3.2	17.0	5 36 3.30	2 28.201						
14	* 8	. .	59.3	13.3	5 36 59.50	2 30.149	56.20	1.948				
15	Venus . . . N.P.	20.0	34.0	48.2	5 37 34.06	2 24.695						
16	* 8	16.1	29.7	43.6	5 38 29.80	2 29.688	—55.74	+4.993				

A 9.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		s.	Rev.
Venus S.P. — * 8	Four comparisons	5 21 0.03	. . . . .	— 56.44	+ 1.948
	Correction of chronometer . .	+ 12.10	Δ t . .	— 0.15	
			. . . .		+ 27″.94
			Δ ρ . .	+ 0.01	+ 0″.13
		h. m. s.		s.	Rev.
Venus N. P. — * 8	Four comparisons	5 26 6.83	. . . . .	— 56.42	+ 4.759
	Correction of chronometer . .	+ 12.10	Δ t . .	— 0.15	
			. . . .		+ 1′ 13″.15
			Δ ρ . .	+ 0.02	+ 0″.34

NOVEMBER 18, 1850.

The planet deformed and tremulous. Observations impossible. A 4.

NOVEMBER 21, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P.	33.9	48.0	1.9	4 48 47.93	2 35.480			29.990	74.0	46.8	41.0
2	B. A. C. . . . 6194	. .	41.2	55.1	4 49 41.13	2 28.091	—53.20	—7.389				
3	Venus . . . N.P.	39.6	53.9	7.5	4 50 53.67	2 32.838						
4	B. A. C. . . . 6194	. .	45.8	0.1	4 51 45.92	2 28.014	52 25	4.824				
5	Venus . . . S.P.	53.2	7.1	21.0	4 53 7.10	2 35.020						
6	B. A. C. . . . 6194	46.0	0.1	14.0	4 54 0.03	2 27.633	52.93	7.387				
7	Venus . . . N.P.	2.0	16.1	29.8	4 56 15.96	2 32.239						
8	B. A. C. . . . 6194	. .	8.7	22.7	4 57 8.71	2 27.415	52.75	4.824				
9	Venus . . . S.P.	37.2	51.0	4.9	4 59 51.36	2 35.101						
10	B. A. C. . . . 6194	29.2	43.5	57.6	5 0 43.43	2 27.080	52.07	8.021				
11	Venus . . . N.P.	45.9	59.5	13.9	5 2 59.76	2 31.427						
12	B. A. C. . . . 6194	38.2	52.3	6.0	5 3 52.16	2 26.788	—52.40	—4.639				

NOVEMBER 21, 1850—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
13	Venus . . . S.P.	54 9	8.7	23.0	5 4 8.86	2 34.534			29.990	74.0	46.8	41.0
14	B. A. C. . . . 6194	47.8	1.5	15.7	5 5 1.66	2 26.550	—52.80	+7.984				
15	Venus . . . N.P.	0.9	14.8	28.4	5 6 14.70	2 30.901						
16	B. A. C. . . . 6194	53.3	7 1	20.0	5 7 6.80	2 26.216	52.10	4.685				
17	Venus . . . S.P.	57.5	11.2	25.8	5 10 11.50	2 33.799						
18	B. A. C. . . . 6194	. .	3.7	17.9	5 11 3.80	2 25.992	52.30	7.807				
19	Venus . . . N.P.	4.9	18 0	32.5	5 11 18.47	2 30.208						
20	B. A. C. . . . 6194	. .	10.8	24.2	5 12 10.72	2 25.801	52.25	4.407				
21	Venus . . . S.P.	18.7	32.7	46.9	5 13 32.76	2 33.249						
22	B. A. C. . . . 6194	. .	24.3	38.5	5 14 24.26	2 25.449	51.50	7.800				
23	Venus . . . N.P.	19.4	33.0	47.5	5 16 33.30	2 29.309						
24	B. A. C. . . . 6194	. .	25.2	39.1	5 17 25.20	2 25.018	51.90	4.291				
25 a	Venus . . . S.P.	11.9	25.9	39.2	5 19 25.67	2 32.282						
26	B. A. C. . . . 6194	4.2	18.3	32.2	5 20 18.23	2 24.551	52.56	7.731				
27	Venus . . . N.P.	21.2	35.0	49.2	5 21 35.13	2 28.498						
28	B. A. C. . . . 6194	. .	27.1	41.2	5 22 27.18	2 24.242	52.05	4.256				
29	Venus . . . S.P.	58.1	11.9	26.1	5 24 12.03	2 31.330						
30	B. A. C. . . . 6194	49.3	3.3	17.0	5 25 3.20	2 23.639	51.17	7.691				
31	Venus . . . N.P.	20.0	34.2	48.0	5 26 34.06	2 27.342						
32	B. A. C. . . . 6194	. .	24.9	39.3	5 27 25.06	2 23.234	51.00	4.108				
33	Venus . . . S.P.	20.0	34.1	48.0	5 31 34.03	2 29.892						
34	B. A. C. . . . 6194	11.9	25.2	39.5	5 32 25.53	2 22.432	51.50	7.460				
35	Venus . . . N.P.	44.8	59.1	12.5	5 34 58.80	2 25.845						
36	B. A. C. . . . 6194	. .	50.2	4.2	5 35 50.20	2 22.049	51.40	3.796				
37	Venus . . . S.P.	52.1	6.2	20.0	5 38 6.10	2 27.970						
38	B. A. C. . . . 6194	43.2	57.1	11.4	5 39 57.23	2 20.571	51.13	7.399				
39	Venus . . . N.P.	21.0	35.0	48.9	5 40 34.96	2 23.642						
40	B. A. C. . . . 6194	. .	26.0	40.2	5 41 26.11	2 19.841	51.15	3.801				
41	Venus . . . S.P.	52.9	7.1	21.0	5 43 7.00	2 26.311						
42	B. A. C. . . . 6194	. .	57.2	11.2	5 43 57.15	2 19.284	—50.15	+7.027				

Remarks.

Night clear and serene. A 8.

a Recorded 31.282.

Results.

		Mean of chronometer times.		Venus — ✱ Δ α.	Δ δ.
		h. m. s.		s.	Rev.
Venus S. P. — B. A. C. 6194 . .	Eleven comparisons	5 15 5.85	. . . .	—51.91	+ 7.C09
	Correction of chronometer . .	+ 9.24	Δ t	— 0.14	
			. . . .		+ 1′ 56″.96
			Δ ρ	+ 0.03	+ 0″.56
		h. m. s.		s.	Rev.
Venus N. P. — B. A. C. 6194 . .	Ten comparisons	5 14 47.88	. . . .	— 51.92	+ 4.363
	Correction of chronometer . .	+ 9.24	Δ t	— 0.14	
			. . . .		+ 1′ 7″.07
			Δ ρ	+ 0.02	+ 0″.32

NOVEMBER 24, 1850.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . N.P.	59.3	13.3	27.6	5 2 13.40	2 37.260			30.050	74.0	46.0	40.5
2	*	9.0	23.2	37.0	5 11 23.06	2 30.700	—9 9.66	—6.560				
3	Venus . . . S.P.	35.0	48.7	3.0	5 14 48.90	2 31.658						
4	*	55.5	9.0	23.0	5 24 9.16	2 29.162	—9 20.26	—2.496				

Remarks.

The planet wavy and uncertain; lost in clouds. A 9.

NOVEMBER 30, 1850.

Observations were attempted; but before any stars showed themselves, the planet became deformed and flaming. It is evident from the observations of the 24th and of to-night, that, at the altitude which Venus can be observed at present, it will be impossible to make any comparisons available for the determination of parallax.

NOVEMBER 30 to DECEMBER 7, 1850.

An almost uninterrupted rain.

JANUARY 10, 1851.

The planet seen at 17*h.* 40*m.*; but before any comparisons could be taken it was covered by a bank of clouds.

JANUARY 13, 1851.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . S.F.	. .	2.0	. .	17 56 2.00	2 50.312			30.190	69.0	46.0	40.0
2	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 43.735	. . .	+23.293				
3	Venus . . . N.F.	. .	56.0	. .	17 57 56.00	2 47.131						
4	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 43.968	. . .	26.707				
5	Venus . . . S.F.	. .	41.0	. .	17 59 41.00	2 50.668						
6	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 44.171	. . .	23.373				
7	Venus . . . N.F.	. .	57.0	. .	18 0 57.00	2 47.340						
8	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 44.168	. . .	26.698				
9	Venus . . . S.F.	. .	33.0	. .	18 30 33.00	2 48.712						
10	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.138	. . .	23.296				
11	Venus . . . N.F.	. .	25.0	. .	18 32 25.00	2 45.613						
12	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.065	. . .	26.322				
13	Venus . . . S.F.	. .	8.0	. .	18 34 8.00	2 48.852						
14	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.198	. . .	23.216				
15	Venus . . . N.F.	. .	32.0	. .	18 35 32.00	2 45.841						
16	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.202	. . .	26.171				
17	Venus . . . S.F.	. .	58.0	. .	18 36 58.00	2 49.010						
18	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.291	. . .	23.151				
19	Venus . . . N.F.	. .	17.0	. .	18 38 17.00	2 45.830						
20	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.370	. . .	+26.410				

JANUARY 13, 1851—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s	Rev.	Inches.	°	°	°
21	Venus . . . S.F.	. .	25.0	. .	18 40 25.0	2 49.190			30.190	69.0	46.0	40.0
22	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.462	. . .	+23.142				
23	Venus . . . N.F.	. .	48.0	. .	18 41 48.0	2 46.049						
24	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.510	. . .	26.331				
25	Venus . . . F. .	8.5	21.5	34.7	18 43 21.57							
26	B. A. C. . . . 5839	. .	51.0	3.7	18 43 50.82	. . .	—29 25					
27	Venus . . . S.F.	. .	49.0	. .	18 44 49.0	2 49.329						
28	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.665	. . .	23.206				
29	Venus . . . N.F.	. .	4.2	. .	18 46 4.2	2 46.105						
30	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.470	. . .	26.235				
31	Venus . . . F.	7.4	20.2	33.0	18 47 20.20							
32	B. A. C. . . . 5839	36.5	49.0	2.0	18 47 49.17	. . .	28.97					
33	Venus . . . S.F.	. .	38.5	. .	18 48 38.5	2 49.433						
34	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.731	. . .	23.168				
35	Venus . . . N.F.	. .	57.0	. .	18 49 57.0	2 46.229						
36	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.820	. . .	26.461				
37	Venus . . . S.F.	. .	13.0	. .	18 51 13 0	2 49.548						
38	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.725	. . .	23.047				
39	Venus . . . N.F.	. .	25.0	. .	18 52 25.0	2 46.340						
40	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.831	. . .	26.361				
41	Venus . . . S.F.	. .	52.5	. .	18 53 50.5	2 49.645						
42	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.882	. . .	23.107				
43	Venus . . . N F.	. .	1.0	. .	18 55 1.0	2 46.891						
44	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.820	. . .	25.799				
45	Venus . . . F.	16.2	28.9	41.0	18 56 28.70							
46	B. A. C. . . . 5839	44.0	57.0	10.0	18 56 57.0	. . .	28.30					
47	Venus . . . S.F.	. .	25.0	. .	18 58 25.0	2 49.750						
48	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.910	. . .	23.030				
49	Venus . . . N.F.	. .	51.0	. .	18 59 51.0	2 46.591						
50	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 42.960	. . .	26.239				
51	Venus . . . S.F.	. .	18.2	. .	19 1 18.2	2 49.868						
52	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 43.091	. . .	23.093				
53	Venus . . . N.F.	. .	32.0	. .	19 2 32.0	2 46.710						
54	B. A. C. . . . 5839	. .	. .	. .	. . . .	3 43.030	. . .	+26.190				
55	Venus . . . F.	36.0	48.2	1.0	19 31 48.40	. . .						
56	B. A. C. . . . 5839	. .	. .	29.2	19 32 16.60	. . .	—28.20					

Remarks.

From the 5th comparison to the end taken without illumination of the wires; all these are satisfactory. During the four first the planet was ill defined. A 9.

Results.

		Mean of chronometer times.		Venus — * Δ α.
		h. m. s.		s.
Venus F. — B. A. C. 5839	Four comparisons . . .	18 59 44.79	. . . .	—28.65
	Correction of chronometer	+ 14.13	Δ t	— 0.08
			Δ ρ	— 0.02

JANUARY 13, 1851—Continued.

Results—Continued.

			h. m. s.		$\Delta\delta$. Rev.
Venus S. — B. A. C. 5839	Twelve comparisons . .		18 38 0.10	. . . .	+ 23.174
	Correction of chronometer		+ 14.32	. . . .	+ 5′ 56″.22
				$\Delta\rho$	+ 5″.59
			h. m. s.		Rev.
Venus N. — B. A. C. 5839	Twelve comparisons . .		18 39 23.77	. . . .	+ 26.333
	Correction of chronometer		+ 14.32	. . . .	+ 6′ 44″.77
				$\Delta\rho$	+ 6″.67

JANUARY 15, 1851.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. $\Delta\alpha$.	$\Delta\delta$.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.		°	°
1	Venus . . S. . .	. .	17.3	. .	17 31 17.3	2 49.799			29.930	74.0	53.0	46.0
2	Lalande . . 31543 .	. .	. .	. .	. . . .	2 53.558	. . .	+3.759				
3	Venus . . N. . .	. .	5.5	. .	17 36 5.5	2 46.708						
4	Lalande . . 31543 .	. .	. .	. .	. . . .	2 53.639	. . .	6.931				
5	Venus . . S. . .	. .	22.2	. .	17 40 22.2	2 50.442						
6	Lalande . . 31543 .	. .	. .	. .	. . . .	2 54.385	. . .	3.943				
7	Venus . . N. . .	. .	4.2	. .	17 41 4.2	2 47.333						
8	Lalande . . 31543 .	. .	. .	. .	. . . .	2 54.452	. . .	7.119				
9	Venus . . S. . .	. .	25.2	. .	17 41 25.2	2 50.958						
10	Lalande . . 31543 .	. .	. .	. .	. . . .	2 54.872	. . .	3.914				
11	Venus . . N. . .	. .	55.0	. .	17 44 55.0	2 47.929						
12	Lalande . . 31543 .	. .	. .	.	. . . .	2 54.848	. . .	6.919				
13	Venus . . S. . .	. .	15.2	. .	17 47 15.2	2 51.310						
14	Lalande . . 31543 .	. .	. .	. .	. . . .	2 55.041	. . .	3.731				
15	Venus . . N. . .	. .	39.2	. .	17 48 39.2	2 48.192						
16	Lalande . . 31543 .	. .	. .	. .	. . . .	2 55.302	. . .	7.110				
17	Venus . . F. . .	36.2	49.2	2.0	17 50 49.13							
18	Lalande . . 31543 .	58.0	11.0	24.0	17 51 11.00	. . .	—21.87					
19	Venus . . F. . .	2.2	15.2	29.0	17 54 14.80							
20	Lalande . . 31543 .	24.0	37.0	50.0	17 54 37.00	. . .	22.20					
21	Venus . . F. . .	12.5	25.7	39.0	17 55 25.73							
22	Lalande . . 31513 .	34.3	47.2	0.5	17 55 47.33	. . .	21.60					
23	Venus . . F. . .	35.2	48.3	1.0	17 56 48.17							
24	Lalande . . 31543 .	57.0	. .	23.0	17 57 10.00	. . .	—21.83					
25	Venus . . S. . .	. .	3.7	. .	17 58 3.7	2 51.731						
26	Lalande . . 31543 .	. .	. .	. .	. . . .	2 55.519	. . .	3.788				
27	Venus . . N. . .	. .	20.2	. .	17 59 20.2	2 48.650						
28	Lalande . . 31543 .	. .	. .	. .	. . . .	2 55.721	. . .	7.071				
29	Venus . . S. . .	. .	43.5	. .	18 0 43.5	2 52.049						
30	Lalande . . 31543	. .	. .	. .	. . . .	2 55.695	. . .	3.646				
31	Venus . . N. . .	. .	14.0	. .	18 2 14.0	2 48.788						
32	Lalande . . 31543 .	. .	. .	. .	. . . .	2 55.936	. . .	7.148				
33	Venus . . S. . .	. .	1.3	. .	18 9 1.3	2 52.175						
34	Lalande . . 31543 .	. .	. .	. .	. . . .	2 56.022	. . .	3.847				
35	Venus . . N. . .	. .	23.0	. .	18 10 23.0	2 49.190						
36	Lalande . . 31543 .	. .	. .	. .	. . . .	2 56.062	. . .	6.872				
37	Venus . . S. . .	. .	51.2	. .	18 11 51.2	2 52.555						
38 a	Lalande . . 31543 .	. .	. .	. .	. . . .	2 56.231	. . .	3.676				
39	Venus . . N. . .	. .	3.0	. .	18 12 3.0	2 49.296						
40	Lalande . . 31543 .	. .	. .	. .	. . . .	2 56.259	. . .	+6.963				

JANUARY 15, 1851—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Mars—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
41	Venus . . S. . .	. .	23.2	. .	18 13 23.2	2 52.790			29.930	74.0	53.0	46.0
42	Lalande . . 31543 .	. .	. .	. .	. . . .	2 56.342	. . .	+3.552				
43	Venus . . N. . .	. .	15.0	. .	18 14 15.0	2 49.648						
44	Lalande . . 31543 .	. .	. .	. .	. . . .	2 56.572	. . .	6.924				
45	Venus . . S. . .	. .	14.2	. .	18 15 14.2	2 52.865						
46	Lalande . . 31543 .	. .	. .	. .	. . . .	2 56.700	. . .	3.835				
47	Venus . . N. . .	. .	9.2	. .	18 16 9.2	2 49.810						
48	Lalande . . 31543 .	. .	. .	. .	. . . .	2 56.759	. . .	6.949				
49	Venus . . F. . .	49.5	2.7	16.0	18 19 2.73							
50	Lalande . . 31543 .	. .	23.2	36.0	18 19 22.98	. . .	—20.25					
51	Venus . . F. . .	0.9	13.8	26.9	18 20 13.53							
52	Lalande . . 31543 .	. .	34.0	47.1	18 20 33.73	. . .	20.20					
53	Venus . . F. . .	12.4	25.1	38.0	18 21 25.17							
54	Lalande . . 31543 .	32.0	45.1	58.0	18 21 45.03	. . .	19 86					
55	Venus . . F. . .	19.2	31.7	45.0	18 22 31.96							
56	Lalande . . 31543 .	39.0	51.5	4.1	18 22 51.53	. . .	19.57					
57	Venus . . S. . .	. .	8.0	. .	18 24 8.0	2 53.384						
58	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.030	. . .	3.646				
59	Venus . . N. . .	. .	47.0	. .	18 25 47.0	2 50.347						
60	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.132	. . .	6.785				
61	Venus . . S. . .	. .	1.0	. .	18 33 1.0	2 53.649						
62	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.357	. . .	3.708				
63	Venus . . N. . .	. .	20.9	. .	18 34 20.9	2 50.648						
64	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.418	. . .	6.770				
65	Venus . . S. . .	. .	57.0	. .	18 35 57.0	2 53.839						
66	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.438	. . .	3.599				
67	Venus . . N. . .	. .	2.9	. .	18 37 2.9	2 50.839						
68	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.558	. . .	6.719				
69	Venus . . S. . .	. .	29.2	. .	18 38 29.2	2 53.978						
70	Lalande . . 31543 .	. .	. .	. .	. . . .	5 57.562	. . .	3.584				
71	Venus . . N. . .	. .	27.2	. .	18 39 27.2	2 50.803						
72	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.528	. . .	6.725				
73	Venus . . S. . .	. .	1.8	. .	18 42 1.8	2 54.008						
74	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.712	. . .	3.704				
75	Venus . . N. . .	. .	18.2	. .	18 43 18.2	2 50.975						
76	Lalande . . 31543 .	. .	. .	. .	. . . .	2 59.631	. . .	6.656				
77	Venus . . F. . .	28.2	41.0	54.0	18 44 41.07							
78	Lalande . . 31543 .	. .	59.0	12.5	18 44 59.32	. . .	18.25					
79	Venus . . F. . .	43.9	57.0	9.6	18 45 56.83							
80	Lalande . . 31543 .	2.0	14.8	28.1	18 46 14.97	. . .	18.14					
81	Venus . . F. . .	19.5	32.3	45.2	18 47 32.33							
82	Lalande . . 31543 .	. .	. .	4.2	18 47 51.33	. . .	19.00					
83	Venus . . F. . .	49.2	1.2	14.8	18 49 1.73							
84	Lalande . . 31543 .	7.0	19.8	33.0	18 49 19.93	. . .	—18.20					
85	Venus . . S. . .	. .	14.0	. .	18 50 14.0	2 54.209						
86	Lalande . . 31543 .	. .	. .	. .	. . . .	2 57.655	. . .	3.446				
87	Venus . . N. . .	. .	23.0	. .	18 51 23.0	2 51.022						
88	Lalande . . 31543 .	. .	. .	. .	. . .	2 57.739	. . .	+6.717				

JANUARY 15, 1851—Continued.

Remarks.

Throughout these comparisons the planet was flickering and undefined. The four last taken without illumination of the wires. A 6.

a This comparison is the first at which the star was distinctly seen.

Results.

		Mean of chronomer times.		Venus — *
				$\Delta\alpha$.
		h. m. s.		s.
Venus F. —Lalande 31513 .	Twelve comparisons . .	18 20 38.60	. . . .	— 20.081
	Correction of chronometer	+ 15.12	Δt	— 0.05
			$\Delta\rho$	— 0.01
				$\Delta\delta$.
		h. m. s.		Rev.
Venus S. —Lalande 31543 .	Sixteen comparisons . .	18 12 24.25	. . . .	+ 3.711
	Correction of chronometer	+ 15.12	. . . .	+ 57″.04
			$\Delta\rho$	+ 0″.11
		h. m. s.		Rev.
Venus N. —Lalande 31543 .	Sixteen comparisons . .	18 13 35.46	. . . .	+ 6.879
	Correction of chronometer	+ 15.12	. . . .	+1′ 45″.74
			$\Delta\rho$	+ 0″.18

JANUARY 24, 1851.

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. $\Delta\alpha$.	$\Delta\delta$.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Taylor . . .	8219	. .	. .	. .	. . . .	2 33.075	. . .	—3.066	30.350	70.0	42.0	30.0
2	Venus . . .	S. .	. .	44.0	. .	17 59 44.0	2 36.141						
3	Taylor . . .	8219	. .	. .	. .	. . . .	2 33.172	. . .	0.433				
4	Venus . . .	N. .	. .	51.5	. .	18 0 51.5	2 33.605						
5	Taylor . . .	8219	. .	. .	. .	. . . .	2 33.165	. . .	3.164				
6	Venus . . .	S. .	. .	2.0	. .	18 2 2.0	2 36.329						
7	Taylor . . .	8219	. .	. .	. .	. . . .	2 33.210	. . .	0.475				
8	Venus . . .	N. .	. .	59.0	. .	18 3 59.0	2 33.685						
9	Taylor . . .	8219	. .	. .	. .	. . . .	2 33.252	. . .	3.167				
10	Venus . . .	S. .	. .	21.0	. .	18 5 21.0	2 36.419						
11	Taylor . . .	8219	. .	. .	. .	. . . .	2 33.312	. . .	0.398				
12	Venus . . .	N. .	. .	20.0	. .	18 6 20.0	2 33.710						
13	Taylor . . .	8219	. .	. .	. .	. . . .	2 33.581	. . .	3.037				
14	Venus . . .	S. .	. .	59.0	. .	18 7 59.0	2 36.618						
15	Taylor . . .	8219	. .	. .	. .	. . . .	2 33.489	. . .	—0.431				
16	Venus . . .	N. .	. .	3.0	. .	18 9 3.0	2 33.920						
17	Taylor . . .	8219	56.0	9.0	. .	18 10 9.17	. . .	+20.70					
18	Venus . . .	F. .	16.9	29.5	43.2	18 10 29.87							
19	Taylor . . .	8219	13.0	26.0	. .	18 11 25.97	. . .	21.30					
20	Venus . . .	F. .	34.3	47.3	0.2	18 11 47.27							
21	Taylor . . .	8219	34.7	47.5	. .	18 13 47.58	. . .	21.45					
22	Venus . . .	F. .	56.0	9.1	22.0	18 14 9.03							
23	Taylor . . .	8219	46.0	59.2	. .	18 14 59.03	. . .	+22.00					
24	Venus . . .	F. .	8.2	21.0	33.9	18 15 21.03							

JANUARY 24, 1851—Continued.

Remarks.

Planet very restless, and star of comparison dimly seen. The star used may not be the star of the catalogue; it was taken as the brightest in the vicinity. A 5.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		s.	
Venus F. —Taylor 8219 . .	Four comparisons . . .	18 12 56.80	. . . .	+ 21.36	
	Correction of chronometer	+ 19.19	Δ t	+ 0.05	
			Δ ρ	0.00	
		h. m. s.			Rev.
Venus S. —Taylor 8219 . .	Four comparisons . . .	18 3 46.05	. . . .		— 3.108
	Correction of chronometer	+ 19.19	. . . .		— 47″.77
			Δ ρ		— 0″.09
		h. m. s.			Rev.
Venus N. —Taylor 8219 . .	Four comparisons . . .	18 5 3.37	. . . .		— 0.434
	Correction of chronometer	+ 19.19	. . . .		— 6″.67
			Δ ρ		— 0″.01

INFERIOR CONJUNCTION OF VENUS:

1852.

MAY 31, 1852.												
No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Venus—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P. .	0.0	15.4	31.0	7 54 15.47	3 42.912			29.970	72.0	70.0	64.0
2	B. Z. . . . 339.86	. .	54.0	10.0	7 54 54.27	1 41.542	—38.80	—31.461				
3	Venus . . . N.P. .	29.1	45.0	0.8	7 56 44.97	3 40.775						
4	B. Z. . . . 339.86	. .	23.0	38.5	7 57 22.82	1 41.470	37.85	29.396				
5	Venus . . . S.P. .	52.0	7.1	23.0	8 0 7.37	3 42.968						
6	B. Z. . . . 339.86	. .	. .	1.0	8 0 45.27	1 41.366	37.90	31.693				
7	Venus . . . N.P. .	35.4	51.0	7.1	8 1 51.17	3 40.898						
8	B. Z. . . . 339.86	. .	29.0	44.2	8 2 28.72	1 41.521	37.55	29.468				
9	Venus . . . S.P. .	17.2	31.9	48.0	8 4 32.37	3 42.961						
10	B. Z. . . . 339.86	. .	9.0	35.0	8 5 9.42	1 41.552	37.05	31.500				
11	Venus . . . S.P. .	31.9	48.0	3.0	8 11 47.63	3 43.101						
12	B. Z. . . . 339.86	. .	24.0	39.2	8 12 23.73	1 41.094	36.10	32.108				
13	Venus . . . N.P. .	25.9	42.1	57.2	8 13 41.73	3 41.089						
14	B. Z. . . . 339.86	. .	17.0	33.0	8 14 17.08	1 41.245	35.35	29.935				
15	Venus . . . S.P. .	22.0	37.5	53.0	8 15 37.50	3 43.280						
16	B. Z. . . . 339.86	. .	13.0	29.0	8 16 13.35	1 41.152	35.85	32.219				
17	Venus . . . N.P. .	35.0	50.2	6.0	8 17 50.40	3 41.152						
18	B. Z. . . . 339.86	. .	. .	41.2	8 18 25.65	1 41.058	35.25	30.185				
19	Venus . . . S.P. .	38.0	54.1	9.7	8 19 53.93	3 43.256						
20	B. Z. . . . 339.86	. .	29.2	45.0	8 20 29.13	1 40.971	35.20	32.376				
21	Venus . . . N.P. .	11.2	27.0	42.9	8 21 27.03	3 41.095						
22	B. Z. . . . 339.86	. .	1.3	17.5	8 22 1.48	1 40.975	34.45	30.211				
23	Venus . . . S.P. .	31.9	47.2	3.0	8 23 47.37	3 43.260						
24	B. Z. . . . 339.86	. .	21.5	37.5	8 24 21.77	1 40.888	34.40	32.463				
25	Venus . . . N.P. .	24.5	40.0	55.3	8 25 39.93	3 41.120						
26	B. Z. . . . 339.86	. .	14.3	30.0	8 26 14.43	1 40.801	34.50	30.410				
27	Venus . . . S.P. .	45.1	0.8	16.2	8 28 0.70	3 43.248						
28	B. Z. . . . 339.86	. .	34.0	49.5	8 28 33.95	1 40.705	33.25	32.634				
29	Venus . . . N.P. .	33.4	49.1	5.0	8 29 49.16	3 41.210						
30	B. Z. . . . 339.86	. .	22 5	38.0	8 30 22.36	1 40.615	—33.20	—30.686				

A 10.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		s.	Rev.
Venus S. P. —B. Z. 339.86 .	Eight comparisons . . .	8 12 15.29	. . . .	— 36.07	— 32.057
	Correction of chronometer	— 1 30.59	Δ t	— 0.10	
			. . . .		— 8′ 12″.75
			Δ ρ	— 0.01	— 0″.31

MAY 31, 1852—Continued.

Results—Continued.

		h. m. s.		s.	Rev.
Venus N. P. —B. Z. 339.86 .	Seven comparisons . . .	8 15 17.77	. . . .	— 35.45	— 30.041
	Correction of chronometer	— 1 30.59	Δt	— 0.09	
			. . . .		— 7′ 41′.77
			Δρ	— 0.01	— 0″.29

JUNE 2, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δα.	Δδ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Lalande . . 15518	40.2	55.2	11.0	8 50 55.47	2 42.098	+2 3.53	—0.667				
2	Venus . . . S.P. .	48.0	59.0	10.0	8 52 59.00	2 42.765						
3	Lalande . . 15548	10.2	26.2	41.0	8 54 25.80	2 41.804	+2 3.57	+1.470				
4	Venus . . . N P. .	13.9	29.1	45.1	8 56 29.37	2 40.334						

Remarks.

Clouds all round, near the horizon. A 10.
Correction for chronometer, — 1m. 30s.35.

JUNE 5, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δα.	Δδ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	B. A. C. . . 2700 .	20.2	36.0	51.0	7 35 35.73	1 44.298	+3 58.37	—48.220	29.990	70.0	61.0	61.0
2	Venus . . S.P. .	18.9	33.9	49.5	7 39 34.10	4 49.541						
3	B. A. C. . . 2700 .	16.2	31.0	. .	7 40 31.42	1 44.191	3 59.05	46.114				
4	Venus . . N.P. .	14.8	30.5	46.1	7 44 30.47	4 47.328						
5	B. A. C. . . 2700 .	10.2	25.7	41.2	7 49 25.70	1 43.958	4 0.07	48.758				
6	Venus . . S.P. .	10.5	25.8	41.0	7 53 25.77	4 49.739						
7	B. A. C. . . 2700 .	6.2	21.2	37.0	7 55 21.47	1 43.970	4 0.90	—46.597				
8	B Z. . . . 279.192	. .	5.0	21.0	7 57 5.37	4 49.580	2 17.00	+ 1.990				
9	Venus . . N.P. .	7.1	22.0	38.0	7 59 22.37	4 47.590						
10	B. Z. . . . 279.192	41.9	57.0	12.0	8 0 56.97	4 49.456	2 17.76	— 0.553				
11	Venus . . S.P. .	59.0	15.0	30.2	8 3 14.73	4 50.009						
12	B. Z. . . . 279.192	55.1	10.5	26.0	8 5 10.53	4 49.262	2 18.44	— 0.757				
13	Venus . . S.P. .	13.2	29.0	44.7	8 7 28.97	4 50.019						
14	B. Z. . . . 279.192	36.8	52.3	8.2	8 8 52.43	4 49.261	2 19.30	+ 1.563				
15	Venus . . N.P. .	56.0	12.0	27.2	8 11 11.73	4 47.698						
16	B. Z. . . . 279.192	47.2	3.1	18.5	8 20 2.93	4 48.903	2 20.94	— 1.379				
17	Venus . . S.P. .	8.1	22.9	39.1	8 22 23.37	4 50.282						
18	B. Z. . . . 279.192	41.0	56.2	12.5	8 23 56.57	4 48.808	2 20.95	+ 0.827				
19	Venus . . N.P. .	. .	17.5	33.1	8 26 17.52	4 47.981						
20	B. Z. . . . 279.192	38.1	54.0	9.2	8 23 53.77	4 48.729	2 21.30	+ 0.904				
21	Venus . . N.P. .	59.2	15.0	31.0	8 30 15.07	4 47.825						
22	B. Z. . . . 279.192	38.2	53.0	9.0	8 31 53.40	4 48.579	2 21.60	— 1.693				
23	Venus . . S.P. .	0.0	14.0	31.0	8 34 15.00	4 50.272						
24	B. Z. . . . 279.192	43.0	58.2	14.0	8 36 58.40	4 48.338	+2 22.33	— 1.751				
25	Venus . . S.P. .	5.2	21.0	36.0	8 39 20.73	4 50.089						

JUNE 5, 1852—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
26	B. Z. . . . 279.192	48.2	3.2	18.9	8 41 3.43	4 47.991	+2 22.90	+ 0.323	29.990	70.0	61.0	61.0
27	Venus . . N.P. .	. .	26.0	41.9	8 43 26.33	4 47.668						

Remarks.

Planet quite wavy during all these observations. A 9.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Venus S. P. — B. Z. 279.192 . .	Five comparisons	8 21 20.56	. . . .	+ 2 20.21	— 1.226
	Correction of chronometer . .	— 1 29.85	Δ t	+ 0.38	
			. . . .		— 18″.84
			Δ ρ	0.00	— 0″.01
		h. m. s.		m. s.	Rev.
Venus N. P. — B. Z. 279.192 . .	Five comparisons	7 58 6.60	. . . .	+ 2 20.29	+ 1.121
	Correction of chronometer . .	— 1 29.85	Δ t	+ 0.38	
			. . . .		+ 17″.23
			Δ ρ	0.00	+ 0″.01

JUNE 9, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Lalande . . 16236	34.1	49.7	5.5	7 57 49.77	3 37.395	+1 41.50	+3.655	29.792	73.0	64.0	64.0
2	Venus . . . N.P.	15.9	30.9	47.0	7 59 31.27	3 33.740						
3	Lalande . . 16236	19.2	34.5	49.6	8 1 34.43	3 37.305	1 41.47	0.924				
4	Venus . . . S.P.	0.9	15.8	31.0	8 3 15.90	3 36.381						
5	Lalande . . 16236	32.4	47.4	3.4	8 4 47.73	3 37.240	1 41.60	3.398				
6	Venus . . . N.P.	14.0	29.1	44.9	8 6 29.33	3 33.842						
7	Lalande . . 16236	52.6	7.9	23.6	8 8 8.03	3 37.099	1 42.34	0.780				
8	Venus . . . S.P.	34.9	50.2	6.0	8 9 50.37	3 36.319						
9	Lalande . . 16236	31.2	46.0	2.0	8 15 46.40	3 36.881	1 42.97	2.843				
10	Venus . . . N.P.	14.1	29.0	45.0	8 17 29.37	3 34.038						
11	Lalande . . 16236	37.0	52.0	8.0	8 19 52.33	3 36.749	1 43.43	0.144				
12	Venus . . . S.P.	20.2	36.1	51.0	8 21 35.76	3 36.605						
13	Lalande . . 16236	44.1	59.2	14.6	8 22 59.30	3 36.632	1 43.55	2.570				
14	Venus . . . N.P.	. .	42.9	58.0	8 24 42.85	3 34.062						
15	Lalande . . 16236	54.0	9.0	24.6	8 26 9.20	3 36.539	1 44.17	0.026				
16	Venus . . . S.P.	38.1	53.0	9.0	8 27 53.37	3 36.513						
17	Lalande . . 16236	12.6	27.9	43.0	8 29 27.83	3 36.389	1 44.47	+2.345				
18	Venus . . . N.P.	57.0	12.0	27.9	8 31 12.30	3 34.044						
19	Lalande . . 16236	21.0	36.2	52.0	8 32 36.40	3 36.240	+1 44.93	—0.272				
20	Venus . . . S.P.	6.1	21.0	36.9	8 34 21.33	3 36.512						

JUNE 9, 1852—Continued.												
No. for reference.	Object.	Chron'r time of transit.			Mean of wires	Micr.	Venus—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
21	Lalande . . 16236	46.0	1.0	17.0	8 39 1.33	3 35.740	+1 45.17	+2.028	29.792	73.0	64.0	64.0
22	Venus . . . N.P.	30.6	46.7	2.2	8 40 46.50	3 33.712						
23	Lalande . . 16236	4.5	20.2	35.0	8 42 19.90	3 35.543	. . .	—0.686				
24 a	Venus . . . S.P.	. .	. .	. .	. . . . .	3 36.229						
25	Lalande . . 16236	45.5	1.0	16.2	8 46 0.90	3 35.118	+1 46.40	—0.847				
26	Venus . . . S.P.	32.0	47.0	2.9	8 47 47.30	3 35.959						

Remarks.

The only satisfactory comparisons are the first two. The first four taken without illumination. A 9.

a Wires misread; rejected.

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Venus S. P. — Lalande 16326 . .	Six comparisons	8 24 7.34	. . . .	+ 1 43.79	+ 0.126
	Correction of chronometer .	— 1 30.98	Δ *t*	+ 0.28	
			. . . .		+ 1″.94
			Δ ρ		+ 0″.00
		h. m. s.		m. s.	Rev.
Venus N. P. — Lalande 16236 . .	Six comparisons	8 20 1.94	. . . .	+ 1 43.26	+ 2.806
	Correction of chronometer .	— 1 30.98	Δ *t*	+ 0.28	
			. . . .		+43″.13
			Δ ρ		+ 0″.04

JUNE 10, 1852.												
No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Venus—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	* 8.9	14.3	30.6	46.0	8 8 30.30	3 35.595	+1 58.60	+ 2.953				
2	Venus . . . N.P.	13.9	28.8	44.0	8 10 28.90	3 32.642						
3	* 8.9	45.5	0.5	16.0	8 13 0.67	3 35.361	+1 59.57	+ 0.082				
4	Venus . . . S.P.	45.0	0.1	. .	8 15 0.22	3 35.279						
5	B. Z. . . . 278.32	. .	58.0	14.0	8 15 58.42	1 35.319	—0 58.00	—30.051				

Remarks.

Wind very high. Planet tremulous. A. 6.

Correction for chronometer — 1*m*. 31*s*.52.

JUNE 11, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . N.P.	20.4	35.5	51.0	8 52 35.63	4 46.035			30.250	70.0		66.0
2	Lalande . . 16582	17.9	33.2	49.0	8 55 33.37	2 42.870	—2 57.74	—29.029				
3	Venus . . . S.P.	27.5	42.5	57.5	8 58 42.50	4 48.782						
4	Lalande . . 16582	25.2	39.7	55.0	9 1 39.97	2 41.632	2 57.47	33.014				
5	Venus . . . N.P.	53.1	8.1	. .	9 3 8.55	4 46.160						
6	Lalande . . 16582	49.5	4.6	20.9	9 6 5.00	2 41.562	2 56.45	30.462				
7	Venus . . . S P.	7.9	23.0	. .	9 8 23.20	4 48.782						
8	Lalande . · 16582	4.0	19.5	35.0	9 11 19.50	2 41.442	2 56.30	33.204				
9	Venus . . . N.P.	50.0	5.2	20.4	9 16 5.20	4 46.369						
10	Lalande . . 16582	46.1	1.0	16.0	9 19 1.03	2 41.260	2 55.83	30.973				
11	Venus . . . S.P.	45.0	0.3	15.7	9 20 0.33	4 49.029						
12	Lalande . . 16582	40.7	56.0	11.0	9 23 55.90	2 41.100	2 55.57	33.793				
13	Venus . . . N.P.	21.5	36.0	51.9	9 26 36.47	4 46.501						
14	Lalande . . 16582	16.0	31.2	46.2	9 29 31.13	2 40.788	2 54.66	31.577				
15	Venus . . . S.P.	49.1	4.1	20.0	9 31 4.40	4 48.899						
16	Lalande . . 16582	42.6	58.2	13.7	9 33 58.17	2 40.678	2 53.77	34.085				
17	Venus . . . N.P.	7.1	23.0	37.9	9 36 22 66	4 26.181						
18	Lalande . . 16582	1.2	17.0	32.0	9 39 16.73	2 40.288	2 54.07	31.757				
19	Venus . . . S P.	31.9	47.0	2.0	9 40 46.97	4 48.612						
20	Lalande . . 16582	25.0	40.0	55.5	9 43 40.17	2 39.905	—2 53.20	—31.571				

Remarks.

Planet tremulous. A 9.

Results.

		Mean of chronometer times.		Venus — * Δ α	Δ δ
		h. m. s.		m. s.	Rev.
Venus S. P. — Lalande 16582 .	Five comparisons	9 19 47.48	. . . .	—2 55.26	— 33.733
	Correction of chronometer .	—1 31.49	Δ t . . .	— 0.48	
			. . . .		—8′ 38″.52
			Δ ρ . .	— 0.14	— 1″.88
		h. m. s.		m. s.	Rev.
Venus N. P. — Lalande 16582 .	Five comparisons	9 16 7.80	. . . .	—2 55.75	— 30.759
	Correction of chronometer .	—1 31.49	Δ t . . .	— 0.46	
			. . . .		—7′ 52″.81
			Δ ρ . .	— 0.13	— 1″.71

JUNE 12, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . N.P.	40.5	56.0	11.0	8 16 55.83	4 29.782			30.312	72.0		70.0
2 a	Lalande . . 16659	42.0	57.0	12.2	8 19 57.06	2 25.145	—3 1.23					
3	Venus . . . S.P.	18.7	34.3	50.0	8 21 34.33	4 32.429						
4	Lalande . . 16659	20.7	35.6	51.2	8 24 35.83	2 37.891	—3 1.50	—20.402				

JUNE 12, 1852—Continued.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
5	Venus . . . N.P.	45.5	0.1	16.0	8 27 0.53	3 43.658			30.312	72.0		70.0
6	Lalande . . 16659	46.5	4.7	17.5	8 30 1.90	2 37.440	—3 1.37	—19.295				
7	Venus . . . S.P.	45.5	1.0	15.9	8 33 0.80	3 45.182						
8	Lalande . . 16659	46.0	1.0	16.0	8 36 1.00	2 37.050	—3 0.20	—21.109				

Remarks.

Observations interrupted. The night growing misty. A 8.

Correction for chronometer — 1*m*. 31*s*.27.

a Declination observation rejected.

JUNE 14, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Lalande . . 16641	39.1	54.4	10.4	8 8 54.63	2 34.325	+1 44.87	+0.433	30.276	78.0		77.0
2	Venus . . . N.P.	25.1	39.8	53.6	8 10 39.50	4 33.892						
3	Lalande . . 16641	24.1	39.1	55.0	8 12 39.40	2 34.141	1 46.10	—2.349				
4	Venus . . . S.P.	9.9	25.6	41.0	8 14 25.50	4 36.490						
5	Lalande . . 16641	20.2	35.0	50.8	8 21 35.33	2 33.723	1 46.64	+0.838				
6	Venus . . . N.P.	6.8	22.1	37.0	8 23 21.97	4 32.885						
7	Lalande . . 16641	40.5	55.0	10.8	8 24 55.43	2 33.488	1 46.70	—2.950				
8	Venus . . . S.P.	27.1	42.1	57.2	8 26 42.13	4 36.438						
9	Lalande . . 16641	52.0	7.2	23.1	8 28 7.43	2 33.350	+1 47.17	—3.012				
10	Venus . . . S.P.	39.2	54.6	10.0	8 29 54.60	4 36 362						

Remarks.

Observations interrupted by clouds. A 10.

Correction for chronometer — 1*m*. 31*s*.27.

JUNE 15, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . S.P.	40.8	56.1	11.9	7 52 56.27	4 34.322						
2	Lalande . . 17013	25.1	40.0	55.0	7 59 40.03	4 25.228	—6 43.76	— 9.091				
3	Lalande . . 17040	. .	9.0	. .	8 0 9.03	5 26.210	7 12.76	+51.888				
4	Venus . . . N.P.	52.5	8.0	23.1	8 3 7.87	4 31.709						
5	Lalande . . 17013	35.5	50.8	. .	8 9 50.77	4 24.919	6 42.90	— 6.790				
6	Lalande . . 17040	. .	15.0	. .	8 10 14.97	5 25.875	—7 7.10	+54.163				

JUNE 15, 1852—Continued.

Remarks.

Planet tremulous, and star badly seen. A 8.

Correction for chronometer — 1m. 31s.32.

JUNE 20, 1852.

Star of comparison could not be seen. A 7.

JUNE 23, 1852.

To-day Venus should have been observed in the daylight with δ Cancri, but it rained or was cloudy all day.

JUNE 25, 1852.

Observations commenced; but before any comparisons could be made, the planet became too undefined and tremulous. A 7.

JUNE 26, 1852.

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . .	N.P. .	43.0	58.0	13.0	8 59 58.00	3 41.068			30.168	73.0		68.5
2	B. Z. . . .	274.30	3.5	19.0	31.0	9 2 18.83	4 36.532	—2 20.83	+8.351				
3	Venus . . .	S.P. .	57.9	12.8	28.0	9 4 12.90	3 43.841						
4	B. Z. . . .	274.30	18.2	32.9	48.6	9 6 33.23	4 35.948	2 20.33	4.994				
5	Venus . . .	N.P. .	56.9	12.1	26.7	9 8 11.90	3 38.422						
6	B. Z. . . .	274.30	17.5	32.0	48.0	9 10 32.50	4 33.698	2 20.60	8.163				
7	Venus . . .	S.P. .	58.0	13.0	28.0	9 14 13.00	3 41.018						
8	B. Z. . . .	274.30	17.8	33.0	48.0	9 16 32.93	3 45.709	2 19.93	5.309				
9	Venus . . .	N.P. .	3.0	17.9	33.0	9 19 17.96	4 37.048						
10	B. Z. . . .	274.30	. .	38.5	54 0	9 21 38.76	4 31.760	—2 20.80	+7.599				

Remarks.

These observations without illumination. The planet tremulous and uncertain. A 10.

Correction for chronometer — 1m. 25s.23.

JUNE 27, 1852.

No. for reference.	Object.		Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
			s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . .	S.P. .	32.0	47.0	2.9	7 53 47.30	4 41.719						
2	B. Z. . . .	274.33	20.0	35.2	51.0	7 57 35.40	2 46.099	—3 48.10	—21.484				
3	Venus . . .	N.P. .	26.0	41.0	56.0	8 0 41.00	4 37.950						
4	B. Z. . . .	274.33	14.0	29.0	44.0	8 4 29.00	2 45.173	—3 48.00	—18.641				

JUNE 27, 1852—Continued.

Remarks.

High winds and clouds. A 7.

Correction for chronometer — 1m. 24s.02.

JUNE 29, 1852.

Star of comparison not visible. A 10.

The planet was also observed on the 2d, 3d, 4th, 5th, 6th, 7th, and 9th of July, but on none of these days were the observations of the slightest value. Observations were also attempted on the 14th, 15th, 17th, 26th, 29th, 30th, and 31st of August, and on the 1st, 2d, 5th, 7th, and 13th of September. Those of the 26th and 29th of August, and 5th of September, which follow, are the only ones in which any comparisons could be made.

AUGUST 26, 1852.

No. for reference.	Object.	Chron'r time of transit.			Mean of wires.	Micr.	Venus—Star.		Bar.	Thermometers.		
		A.	B.	C.			Δ α.	Δ δ.		Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Lalande . . 15125 .	36.1	51.0	6.0	15 25 51.03	3 46.580	+3 2.97	+14.297	29.810	79.0		82.0
2	Venus . . S.F. .	39.0	54.0	9.0	15 28 54.00	2 45.260						
3	Lalande . . 15125 .	35.9	51.0	6.0	15 30 50.97	3 47.449	3 3.03	17.398				
4	Venus . . N.F. .	39.0	54.0	9.0	15 33 54.00	2 43.028						
5	Lalande . . 15125 .	2.0	17.0	32.0	15 35 17.00	3 47.992	3 3.90	14.699				
6	Venus . . S.F. .	6.0	20.8	. .	15 38 20.90	2 46.270						
7	Lalande . . 15125 .	42.0	56.2	11.0	15 39 56.40	3 48.550	3 3.76	17.557				
8	Venus . . N.F. .	45.5	0.0	15.0	15 43 0.16	2 43.970						
9	Lalande . . 15125 .	42.0	57.0	12.0	15 46 57.00	3 49.114	3 4.53	14.743				
10	Venus . . S.F. .	46.8	1.3	16.5	15 50 1.53	2 47.348						
11	Lalande . . 15125 .	9.1	24.6	39.4	15 51 24.37	3 49.551	3 4.89	17.618				
12	Venus . . N.F. .	14.2	29.3	44.3	15 54 29.26	2 44.910						
13	Lalande . . 15125 .	57.0	12.0	27.0	15 55 12.00	3 49.821	3 5.13	14.910				
14	Venus . . S.F. .	2.1	17.3	32.0	15 58 17.13	2 47.888						
15	Lalande . . 15125 .	26.3	41.2	56.2	16 0 41.23	3 49.972	+3 5.77	+17.471				
16	Venus . . N.F. .	32.0	47.1	1.9	16 3 47.00	2 45.478						

Remarks.

The planet very tremulous. Observations altogether unsatisfactory. A .

Results.

		Mean of chronometer times.		Venus — * Δ α.	Δ δ.
		h. m. s.		m. s.	Rev.
Venus S. F. — Lalande 15125 .	Four comparisons . . .	15 43 53.39	. . . . . .	+3 4.13	+ 14.662
	Correction of chronometer	— 15.81	Δ t . . .	+ 0.50	
			. . . .		+3′ 45″.37
			Δ ρ	— 0.02	+ 0″.31
		h. m. s.		m. s.	Rev.
Venus N. F. — Lalande 15125 .	Four comparisons . . .	15 48 47.60	. . . .	+3 4.36	+ 17.511
	Correction of chronometer	— 15.81	Δ t	+ 0.50	
			. . . .		+4′ 29″.19
			Δ ρ	— 0.02	+ 0″.43

AUGUST 29, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Att.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	* 9	24.0	39.2	53.5	15 27 38.90	3 32.932	+4 20.40	—38.599	30.200	69.0		72.0
2	Venus . . . S.F.	44.0	. .	14.6	15 31 59.30	5 28.495						
3	Venus . . . S.F.	30.5	45.5	59.5	15 37 45.16	5 28.932						
4	B. A. C. . . . 2639	. .	5.0	20.0	15 38 5.16	2 26.712	—20.00	45.256				
5	Venus . . . N.F.	55.5	10.3	25.8	15 40 10.53	5 26.532						
6	B. A. C. . . . 2639	15.0	29.6	44.5	15 40 29.70	2 26.712	19.17	43.216				
7	Venus . . . S.F.	12.6	27.1	42.3	15 42 27.33	5 29.548						
8	B. A. C. . . . 2639	32.0	46.4	1.7	15 42 46.70	2 27.200	19.37	45.384				
9	Venus . . . N.F.	20.8	35.5	50.6	15 44 35.63	5 26.885						
10	B. A. C. . . . 2639	39.0	54.1	9.1	15 44 54.07	2 27.342	18.44	42.579				
11	Venus . . . S.F.	39.7	54.6	9.0	15 46 54.43	5 29.882						
12	B. A. C . . . 2639	59.0	13.0	28.2	15 47 13.40	2 27.480	18.97	45.438				
13	Venus . . . N.F.	49.7	4.2	19.2	15 49 4.37	5 27.200						
14	B. A. C. . . . 2639	8.7	23.0	38.0	15 49 23.23	2 27.660	18.86	42.576				
15	Venus . . . S.F.	18.3	37.0	48.5	15 52 33.40	5 30.222						
16	B. A. C. . . . 2639	33.2	51.7	6.5	15 52 51.40	2 27.969	18.00	45.289				
[illegible]	Venus . . . N.F.	42.0	57.3	12.2	15 54 57.17	5 27.552						
[illegible]	B. A. C. . . . 2639	0.0	15.0	30.0	15 55 15.00	2 27.960	—17.83	—42.628				

Remarks.

The star nearest the planet was compared. The observations are, however, unsatisfactory—the planet being lambent and wavering. A 6.

Results.

		Mean of chronometer times.		Δ α.	Δ δ.
		h. m. s.		s.	Rev.
Venus S. F. — B. A. C. 2639 .	Four comparisons . . .	15 44 55.08	. . . .	—19.08	— 45.342
	Correction of chronometer	— 13.69	Δ t	— 0.05	
			. . . .		—11′ 36″.96
			Δ ρ	+ 0.05	— 1″.12
		h. m. s.		s.	Rev.
Venus S. F. — B. A. C. 2639 .	Four comparisons . . .	15 47 11.92	. . . .	—18.57	— 42.749
	Correction of chronometer	— 13.69	Δ t	— 0.05	
			. . . .		—10′ 57″.10
			Δ ρ	+ 0.04	+ 1″.06

SEPTEMBER 5, 1852.

No. for reference.	Object.	Chron'r time of transit. A.	B.	C.	Mean of wires.	Micr.	Venus—Star. Δ α.	Δ δ.	Bar.	Thermometers. Air.	Int.	Ex.
		s.	s.	s.	h. m. s.	Rev.	m. s.	Rev.	Inches.	°	°	°
1	Venus . . . S.F.	. .	15.0	30.0	10 9 15.00	2 26.745						
2	*	. .	52.0	7.0	10 10 52.00	5 25.365	—1 37.00	+42.656				
3	*	. .	22.0	38.0	10 11 22.50	5 26.028	2 7.50	42.319				
4	Venus . . . N.F.	44.1	59.1	14.0	10 13 59.07	2 24.368						
5	*	. .	35.0	49.0	10 15 34.52	5 25.751	1 35.45	44.419				
6	*	. .	5.0	20.0	10 16 5.02	5 26.295	—2 5.95	+44.963				

Remarks.

Observations unsatisfactory. Correction for chronometer + 10s.49. A 6.

OPPOSITION OF MARS, 1849--50.

DIFFERENTIAL OBSERVATIONS,

WITH

THE 23 FEET EQUATORIAL,

AT

THE OBSERVATORY, CAMBRIDGE, MASS.,

BY PROF. WM. CRANCH BOND.

OPPOSITION OF MARS:

1849–50.

INTRODUCTORY REMARKS TO THE CAMBRIDGE OBSERVATIONS.

Observations upon Mars and comparison stars, made at the Observatory of Harvard College, 1849–50.

The following observations upon Mars and comparison stars in its neighborhood were made at Cambridge, with the 23-feet Equatorial, in the autumn and winter of 1849–50. The immediate object proposed in undertaking them was the determination of the parallax of the planet by differential observations. Those in declination were intended for comparison with corresponding ones made by the Expedition sent by the American government to Chile, under charge of Lieut. J. M. Gilliss, U. S. N. The Right Ascension observations afford data also for deducing the parallax, by comparing the place of the planet at the evening and morning observations, when occupying a large hour angle west and east of the meridian.

They are comprised in three divisions, viz:

Comparisons of the planet with neighboring stars—

1*st*. By times of transits, marked with a chronometer.

2*d*. By differences of A. R., measured with the micrometer.

3*d*. By differences of declination, measured with the micrometer.

In the reduction of the latter, the value of a revolution of the micrometer head used was—

$$r = 9''.800 + 0''.00026\,(t^\circ - 50^\circ,)$$

t being the temperature in degrees of Fahrenheit's scale.

For the Right Ascension observations, those stars of sufficient brightness nearest to the declination of the planet were commonly taken, preference being given to the stars of the catalogue in the circular of the Chile Expedition, when they were near enough to admit of frequent repetition. But in all cases the same comparison stars were used for the successive evening and morning observations.

The stars compared in declination were taken from the catalogue of the Expedition.

All the observations are reduced to the means for each wire separately, and the times by the chronometer are reduced to the sidereal times at the Observatory. The small corrections applied to the means of the micrometer differences are for the effect of temperature upon the value of the screw.

For the name of the observer, the initials W. C. B. for W. C. Bond, and G. P. B. for G. P. Bond, are employed.

W. C. BOND.

CAMBRIDGE OBSERVATORY, *July* 21, 1853.

RIGHT ASCENSIONS OF MARS: 1849–50.

NOVEMBER 15, 1849.

Mars following limb.		Mars follows star a = 14 mag.		Mars following limb.		Mars follows star a = 14 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
0 40 37.2	40 50.0	34.5	34.0	0 54 55.8	55 9.3	34.3	34.4
44 31.7	44 45.0	35.0	35.0	59 27.6	59 40.0	34.6	34.0
48 12.2	48 25.3	34.0	34.3				

Remarks.

Atmosphere very unfavorable. The star of comparison is in the same declination with Mars.

Observer, W. C. B.

	h. m. s.	Δa. *s.*	No. of obs.		*h. m. s.*	Δa. *s.*	No. of obs.
Mean by first wire .	0 49 32.90			Mean by second wire .	0 49 45.92		
Chronometer fast . .	3 10.74			Chronometer fast . .	3 10.74		
Sid. time	0 46 22.16	34.48	5	Sid. time	0 46 35.18	34.34	5

Mars preceding limb.		Mars follows star a = 14 mag.		Mars preceding limb.		Mars follows star a = 14 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
0 42 21.4	42 34.5	34.1	32.3	0 53 1.8	53 14.7	33.1	32.9
46 20.4	46 33.5	33.1	33.7	56 46.3	56 59.6	33.0	31.1
50 9.9	50 23.4	33.6	33.4				

	h. m. s.	Δa. *s.*	No. of obs.		*h. m. s.*	Δa. *s.*	No. of obs.
Mean by first wire . .	0 49 43.96			Mean by second wire .	0 49 57.14		
Chronometer fast . .	3 10.74			Chronometer fast . .	3 10.74		
Sid. time	0 46 33.22	33.44	5	Sid. time	0 46 46.40	33.28	5

Mars following limb.		Mars precedes star b = 8.9 mag.		Mars following limb.		Mars precedes star b = 8.9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
0 40 37.2	40 50.0	21.8	22.5	0 54 55.8	55 9.3	22.7	22.4
44 31.7	44 45.0	21.9	21.5	59 27.6	59 40.0	21.9	23.0
48 12.2	48 25.3	22.8	22.7				

Remarks.

The star is 5′ north of Mars.

	h. m. s.	Δa. *s.*	No. of obs.		*h. m. s.*	Δa. *s.*	No. of obs.
Mean by first wire .	0 49 32.90			Mean by second wire .	0 49 45.92		
Chronometer fast . .	3 10.74			Chronometer fast . .	3 10.74		
Sid. time	0 46 22.16	22.22	5	Sid. time	0 46 35.18	22.42	5

NOVEMBER 15, 1849—Continued.

Mars preceding limb.		Mars precedes star b = 8.9 mag.		Mars preceding limb.		Mars precedes star b = 8.9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
0 42 21.4	42 34.5	23.6	23.0	0 53 1.8	53 14.7	23.7	24.2
46 20.4	46 33.5	23.6	23.5	53 46.3	53 59.6	24.2	23.7
50 9.9	50 23.4	23.7	22.9				

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire . .	0 49 7.96			Mean by second wire .	0 49 21.14		
Chronometer fast . .	3 10.74			Chronometer fast . .	3 10.74		
Sid. time	0 45 57.22	23.76	5	Sid. time	0 46 10.40	23.50	5

Mars following limb.		Mars follows star a = 13 mag.		Mars following limb.		Mars follows star a = 13 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 4 6.7	4 19.6	34.2	34.1	1 13 3.9	13 19.7	34.3	34.6
9 57.3	10 13.0	34.1	34.3	14 18.2	14 34.1	34.2	34.3
11 40.9	11 57.0	34.1	34.5	15 29.4	15 45.1	33.9	34.1

Remarks.

The observations are liable to errors from the imperfect illumination of the second-hand of the chronometer.

Observer, G. P. B.

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire . .	1 11 26.07			Mean by second wire .	1 11 41.42		
Chronometer fast . .	3 10.76			Chronometer fast . .	3 10.76		
Sid. time	1 8 15.31	34.13	6	Sid. time	1 8 30.66	34.32	6

NOVEMBER 15 and 16, 1849.

Mars following limb.		Mars follows star a = 13 mag.		Mars following limb.		Mars follows star a = 13 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
8 56 42.0	56 56.5	24.2 a	24.5	9 1 25.5	1 40.0	24.3	24.5
58 22.0	58 36.5	23.8	24.0	2 45.0	2 59.4	24.0	24.1
9 0 21.5	0 35.7	24.2	24.2				

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire . .	8 59 55.20			Mean by second wire .	9 0 9.62		
Chronometer fast . .	50.65			Chronometer fast . .	50.65		
Sid. time	8 59 4.55	24.10	5	Sid. time	8 59 18.97	24.26	5

Mars following limb.		Mars follows star b = 13 mag.		Mars following limb.		Mars follows star b = 13 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
9 6 10.8	6 23.7	24.0	24.1	9 10 51.3	11 3.8	23.8	23.8
7 56.3	8 9.2	23.8	24.2	11 47.5	12 0.5	23.9	24.0
8 58.0	9 10.5	24.0	23.5	12 53.0	13 5.5	23.8	23.9

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire . .	9 9 46.15			Mean by second wire .	9 9 58.87		
Chronometer fast . .	50.65			Chronometer fast . .	50 65		
Sid. time	9 8 55.50	23.88	6	Sid. time	9 9 8.22	23.92	6

NOVEMBER 15 and 16, 1849—Continued.

Mars following limb.		Mars precedes star H. C. 12554.		Mars following limb.		Mars precedes star H. C. 12554.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
9 15 53.5	16 6.4	33.0	33 1	9 23 55.5	24 8.0	33.1	34.0
18 31.3	18 44.1	33.7	34.4	26 21.0	26 34.3	33.5	33.2
20 58.5	21 11.3	33.0	33.3				

	h. m. s.	Δ *a.* *s.*	No. of obs.		*h. m. s.*	Δ *a.* *s.*	No. of obs.
Mean by first wire . .	9 21 7.98			Mean by second wire .	9 21 20.82		
Chronometer fast . .	50.66			Chronometer fast . .	50.66		
Sid. time	9 20 17.32	33.26	5	Sid. time	9 20 30.16	33.62	5

Mars following limb.		Mars precedes star H. C. 12554.		Mars following limb.		Mars precedes star H. C. 12554.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
9 31 50.50	32 02.4	32.8	33.6	9 38 58.00	39 10.9	33.8	33.9
34 15.02	34 28.4	34.1	33.6	41 34.00	41 47.0	33.6	33.2
36 31.03	36 44.5	33.2	33.2				

	h. m. s.	Δ *a.* *s.*	No. of obs.		*h. m. s.*	Δ *a.* *s.*	No. of obs.
Mean by first wire .	9 36 37.70			Mean by second wire .	9 36 50.64		
Chronometer fast . .	50.66			Chronometer fast . .	50.66		
Sid. time	9 35 47.04	33.50	5	Sid. time	9 35 59.98	33.50	5

Mars preceding limb.		Mars precedes star H. C. 12554.		Mars preceding limb.		Mars precedes star H. C. 12554.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
9 17 2.4	17 15.6	35.1	34.4	9 25 4.4	25 17.5	35.0	35.0
19 49.7	20 1.3	33.1	34.4	27 41.6	27 54.5	33.7	34.5
22 29.7	22 43.0	34.3	33.9				

	h. m. s.	Δ *a.* *s.*	No. of obs.		*h. m. s.*	Δ *a.* *s.*	No. of obs.
Mean by first wire .	9 22 25.56			Mean by second wire .	9 22 38.38		
Chronometer fast . .	50.66			Chronometer fast . .	50.66		
Sid. time	9 21 34.90	34.24	5	Sid. time	9 21 47.72	34.44	5

Mars preceding limb.		Mars precedes star H. C 12554.		Mars preceding limb.		Mars precedes star H. C. 12554.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
9 32 55.2	33 7.7	34.5	34.3	9 40 16.3	40 29.4	35.5	35.0
35 21.0	35 33.9	35.0	34.6	42 58.0	43 10.6	35.0	35.6
37 49.8	38 2.5	34.2	34.7				

	h. m. s.	Δ *a.* *s.*	No. of obs.		*h. m. s.*	Δ *a.* *s.*	No. of obs.
Mean by first wire .	9 37 52.06			Mean by second wire .	9 38 4.82		
Chronometer fast . .	50.66			Chronometer fast . .	50.66		
Sid. time	9 37 1.40	34.84	5	Sid. time	9 37 14.16	34.84	5

NOVEMBER 16, 1849.

Mars following limb.		Mars precedes star H. C. 12554.		Mars following limb.		Mars precedes star H. C. 12554.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
2 58 59.9	59 14.5	53.9	53.6	3 9 29.0	9 43.1	54.1	54.1
3 3 42.5	3 57.0	54.0	54.1	11 32.0	11 46.5	53.8	54.0
7 43.9	7 58.5	54.0	53.9	13 36.8	13 51.2	54.2	54.3

Remarks.

Bad definition. Observer, G. P. B.

a Recorded 34*s*.2.

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	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by first wire .	3 7 30.69		
Chronometer fast . .	50.66		
Sid. time	3 6 40.03	54.00	6

	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by second wire .	3 7 45.13		
Chronometer fast . .	50.66		
Sid. time	3 6 54.47	54.00	6

NOVEMBER 16 and 17, 1849.

Mars following limb.		Mars precedes star H. C. 15554 = 8 mag.		Mars following limb.		Mars precedes star H. C. 12554 = 8 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*m. s.*	*m. s.*	*h. m. s.*	*m. s.*	*m. s.*	*m. s.*
9 37 25.3	37 39.7	1 3.7	1 3.6	9 48 3.8	48 18.0	1 3.7	1 4.0
39 4.4	39 18.8	3.7	3.6	10 17 5.0	17 19.5	4.5	4.5
41 50.7	42 5.2	3.8	3.8	18 44.8	18 59.2	4.7	4.8
42 34 4	42 49.0	3.6	3.6	20 23.0	20 37.5	4.6	4.6
44 19.1	44 33.4	3.6	3.8	22 22.9	22 37.4	4.6	4.6
46 8.1	46 22.7	3.9	3.8				

Remarks.

Definition good. Observer, G. P. B.

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	h. m. s.	Δ *a.* *m. s.*	No of obs.
Mean by first wire .	9 56 11.05		
Chronometer fast . .	50.95		
Sid. time	9 55 20.10	1 4.04	11

	h. m. s.	Δ *a.* *m. s.*	No. of obs.
Mean by second wire .	9 56 25.49		
Chronometer fast . .	50.95		
Sid. time	9 55 34.44	1 4.05	11

Mars following limb.		Mars follows star 12 mag.		Mars following limb.		Mars follows star 12 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*		*s.*	
10 11 14.4	. . . . .	15.4	. . . .	10 13 42.5	. . . . .	15.4	. . . .
11 46.6	. . . . .	15.6	. . . .	14 26.2	. . . . .	15.4	. . . .
12 39.2	. . . . .	15.6	. . . .	15 6.3	. . . . .	15.5	. . . .

	h. m, s.	Δ *a.* *s.*	No. of obs.
Mean by first wire	10 13 10.87		
Chronometer fast	50.96		
Sid. time	10 12 19.91	15.48	6

NOVEMBER 21, 1849.

Mars following limb.		Mars follows Bessel 523.		Mars following limb.		Mars follows Bessel 523.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 52 12.0	52 26.5	28.3	28.5	1 57 14.1	57 28.6	28.3	28.5
53 20.0	53 34.4	28.6	28.6	58 25.2	58 39.7	28.4	28.4
54 30.3	54 44.6	28.6	28.4	59 32.8	59 47.2	28.2	28.2
55 41.0	55 55.5	28.3	28.5	2 0 54.2	1 8.5	28.4	28.2

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	1 56 28.70			Mean by second wire .	1 56 43.12		
Chronometer fast . .	53.24			Chronometer fast . .	53.24		
Sid. time	1 55 35.46	28.39	8	Sid. time	1 55 49.88	28.41	8

Observer, G. P. B.

Mars following limb.		Mars follows Bessel 523.		Mars following limb.		Mars follows Bessel 523.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
2 7 27.9	7 42.5	27.7	28.2	2 29 26.8	29 41.3	27.0	27.6
8 43.6	8 58.1	27.8	28.1	30 44.3	30 59.0	27.1	27.2
10 37.0	10 51.0	28.1	28.0	32 7.5	32 22.0	27.0	27.1
11 47.1	12 1.4	27.6	27.6	33 57.2	34 11.5	27.2	27.1
13 0.2	13 14.4	28.0	28.0	35 33.1	35 47.7	27.1	27.3
14 15.8	14 29.9	27.8	27.8	36 49.0	37 3.3	27.1	28.3
15 37.0	15 51.3	27.8	27.9	37 58.6	38 13.1	27.2	27.1
16 57.9	17 12.0	27.9	27.6	39 10.6	39 25.0	26.7	27.0
18 43.0	18 57.3	27.4	27.8	40 24.6	40 39.0	26.7	26.8
19 59.2	20 13.4	27.7	27.4	41 35.0	41 49.4	27.0	27.2
21 11.3	21 25.3	27.6	27.3				

Remarks.

One of the wires at 2*h.* 36*m.* was probably recorded 1s. in error.

Observer, W. C. B.

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	2 24 34.60			Mean by second wire .	2 24 48.95		
Chronometer fast . .	53.24			Chronometer fast . .	53.24		
Sid. time	2 23 41.36	27.40	21	Sid. time	2 23 55.71	27.54	21

NOVEMBER 21 and 22, 1849.

Mars following limb.		Mars follows star Bessel 523.		Mars following limb.		Mars follows Bessel 523.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
9 49 40.0	. . .	10.5	. .	9 56 33.5	56 55.0	10.5	10.4
50 14.2	. . .	10.9	. .	57 43.5	58 5.2	10.5	10.6
52 24.0	52 45.6	10.7	10.6	58 34.3	58 55.9	10.3	10.4
53 19.2	53 40.8	10.7	10.6	59 31.8	59 53.5	10.3	10.3
54 14.5	54 36.2	10.7	10.6	10 0 39.9	1 1.6	10.4	10.3
55 19.0	55 40.7	10.4	10.5				

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	9 55 17.63			Mean by second wire .	9 56 50.50		
Chronometer fast . .	53.33			Chronometer fast . .	53.33		
Sid. time	9 54 24.30	10.54	11	Sid. time	9 55 57.17	10.48	9

NOVEMBER 21 and 22, 1849—Continued.

Mars following limb.		Mars follows Bessel 523.		Mars following limb.		Mars follows Bessel 523.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
10 27 0.5	27 19.2	9.5	9.2	10 31 52.5	32 11.3	9.0	9.3
27 48.2	28 7.0	9.2	9.1	32 40.5	. . .	9.1	. .
28 35.8	28 51.5	9.2	9.2	33 11.3	33 30.0	9.3	9.2
29 32.0	29 50.9	9.1	9.3	34 11.5	34 30.3	9.0	9.0
30 18.9	30 37.8	9.0	9.3	34 59.3	. . .	9.0	. .
31 5.5	31 24.2	9.1	9.2	35 4.4	. . .	8.8	. .

	h. m. s.	$\Delta\,a$. *s.*	No. of obs.		*h. m. s.*	$\Delta\,a$. *s.*	No. of obs.
Mean by first wire .	10 31 21.70			Mean by second wire	10 30 42.80		
Chronometer fast . .	53.34			Chronometer fast . .	53.34		
Sid. time	10 30 28.36	9.11	12	Sid. time	10 29 49.46	9.20	9

Mars following limb.		Mars follows Bessel 523.		Mars following limb.		Mars follows Bessel 523.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
10 48 41.6	. . .	8.4	. .	10 52 20.9	52 42.7	8.4	8.4
49 11.7	. . .	8.7	. .	53 11.5	53 33.1	8.3	8.4
50 8.2	50 26 4	8.4	8.6	54 8.3	54 29.9	8.2	8.1
51 27.5	51 49.0	8.5	8.4				

Remarks.

Observed, without illumination, through cirrus clouds. Limb tremulous.

	h. m. s.	$\Delta\,a$. *s.*	No. of obs.		*h. m. s.*	$\Delta\,a$. *s.*	No. of obs.
Mean by first wire .	10 51 18.53			Mean by second wire	10 52 36.22		
Chronometer fast . .	53.34			Chronometer fast . .	53.38		
Sid. time	10 50 25.19	8.41	7	Sid. time	10 51 42.84	8.38	5

NOVEMBER 26 and 27, 1849.

Mars following limb.		Mars follows star $b = 11$ mag.		Mars following limb.		Mars follows star $b = 11$ mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*		*s.*	
10 42 29.4	. . .	17.6	. .	10 45 52.6	. . .	16.4	. .
43 19.0	. . .	18.5	. .	46 35.4	. . .	17.4	. .
43 54.2	. . .	17.4	. .	47 15.5	. . .	17.3	. .
44 37.0	. .	17.5	. .	47 50.9	. . .	17.4	. .
45 15.6	. . .	17.5	. .	48 44.2	. . .	17.2	. .

Remarks.

Star is 5′ north of Mars.

Observer, G. P. B.

	h. m. s.	$\Delta\,a$. *s.*	No. of obs.
Mean by first wire	10 45 35.38		
Chronometer fast	56.55		
Sid. time	10 44 38 83	17.42	10

NOVEMBER 26 and 27, 1849—Continued.

Mars following limb.		Mars precedes H. C. 12237.		Mars following limb.		Mars precedes H. C. 12237.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
11 8 38.8	8 53.5	37.1	37.0	11 14 23.5	14 38.0	37.1	37.4
10 49.5	11 4.0	36.9	37.2	15 49.7	16 4.2	37.4	37.4
12 10.7	12 25.3	37.1	37.2				

	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by first wire . .	11 12 22.34		
Chronometer fast . .	56.56		
Sid. time	11 11 25.78	37.12	5

	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by second wire .	11 12 37.00		
Chronometer fast . .	56.56		
Sid. time	11 11 40.44	37.24	5

NOVEMBER 27, 1849.

Mars following limb.		Mars precedes star *b* = 11 mag.		Mars following limb.		Mars precedes star *b* = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	•	*s.*		*h. m. s.*		*s.*	
1 8 24.8	. . .	22.9	. .	1 11 36.6	. . .	23.1	. .
9 16.0	. . .	22.8	. .	12 25.0	. . .	22.8	. .
10 7.5	. . .	22.8	. .	13 31.3	. . .	22.2	. .
10 50.3	. . .	23.2	. .	15 27.0	. . .	23.5	. .

Remarks.

Observations through passing clouds.

Observer, G. P. B.

	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by first wire	1 11 27.31		
Chronometer fast	56.75		
Sid. time	1 10 30.56	22.94	8

Mars following limb.		Mars precedes star *b* = 11 mag.		Mars following limb.		Mars precedes star *b* = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*		*s.*	
1 23 59.8	. . .	23.4	. .	1 26 43.3	. . .	23.7	. .
25 7.5	. . .	23.6	. .	27 32.5	. . .	23.8	. .
25 55.0	. . .	24.0	. .	28 20.0	. . .	24.0	. .

	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by first wire	1 26 16.51		
Chronometer fast	56.75		
Sid. time	1 25 19.76	23.75	6

Mars following limb.		Mars precedes star *b* = 11 mag.		Mars following limb.		Mars precedes star *b* = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*		*s.*	
1 46 23.5	. . .	25.0	. .	1 47 15.0	. . .	25.0	. .

NOVEMBER 27, 1849—Continued.

	h. m. s.	Δ a. s.	No of obs.
Mean by first wire	1 46 49.25		
Chronometer fast	56.76		
Sid. time	1 45 42.49	25.00	2

Mars following limb.		Mars precedes star b = 11 mag.		Mars following limb.		Mars precedes star b = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 50 17.1	50 30.2	24.9	24.8	1 55 31.2	55 44.3	25.0	25.0
51 18.1	51 31.2	24.9	21.9	56 35.0	56 48.0	25.3	25.3
52 23.5	52 36.5	25.2	25.1	57 38.8	57 51.9	25.3	25.1
53 20.9	53 33.8	24.9	25.2				
54 21.8	54 35.0	25.2	25.0				

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	1 53 55.80			Mean by second wire .	1 54 8.86		
Chronometer fast . .	56.76			Chronometer fast . .	56.76		
Sid. time	1 52 59.04	25.09	8	Sid. time	1 53 12.10	25.05	8

Mars following limb.		Mars precedes star b = 11 mag.		Mars following limb.		Mars precedes star b = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
2 9 50.8	10 3.3	25.5	25.9	2 35 49.0	26 2.0	27.2	26.9
10 59.4	11 12.3	26.0	26.2	37 5.6	37 18.4	27.0	27.6
12 7.3	12 20.3	26.0	26.3	38 18 3	38 31.9	27.7	27.1
14 8.0	14 21.2	26.1	26.1	39 34.0	39 47.0	26.3	27.3
15 56.5	16 9.4	26 1	26.6	40 52.0	41 5.0	27.3	27.3
17 4.6	17 17.7	26.1	26.3	42 2.0	42 15.0	27.5	27.5
18 27.2	18 40.5	26.4	25.8	43 15.0	43 27.9	27.7	27.6
19 42.2	19 55.0	26.1	26 4	44 29.0	44 42.1	28.0	27.6
20 52.0	21 5.0	26.4	26.6	45 41.8	45 54.9	27.5	27.3
22 2.2	22 15.3	26.4	26.9	47 12.1	47 24.7	27.9	28.3
23 12.4	23 25.3	26.6	26.9	48 27.3	48 40.5	27.9	27.7
24 56.8	25 9.4	26.5	27.0	49 40.3	49 53.3	27.9	27.9
26 6.0	26 19.0	26.2	26.6	50 53.8	51 6.8	27.9	28.0
				52 22.8	52 36.7	29.0	27.9

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	2 31 31.42			Mean by second wire .	2 31 44.52		
Chronometer fast . .	56.76			Chronometer fast . .	56.76		
Sid. time	2 30 34.66	26.93	27	Sid. time	2 30 47.76	27.02	27

Observer, W. C. B.

NOVEMBER 27 and 28, 1849.

Mars following limb.		Mars precedes star b = 11 mag.		Mars following limb.		Mars precedes star b = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
10 13 38.3	13 53 5	51.3	51.3	10 32 8.5	32 23.6	52.5	52.4
15 17.4	15 32.5	51.3	51.4	33 40.6	34 55.7	52.3	52.3
17 55.3	18 10.4	51.4	51.6	35 9.4	35 24.5	52.2	52.2
18 29.5	18 44.5	51.5	51.5	38 28.3	38 43.5	52.7	52.7
20 6.3	20 21.4	51.6	51.6	40 14.5	40 29.7	52.7	52.6
21 40.5	21 55.7	51.9	51.8	41 52.2	42 7.4	52.8	52.9
23 13.5	23 28.8	52.0	51.7	43 29.3	43 44.5	52.7	52.8
24 54.8	25 10.0	51.8	51.8	45 49.9	46 5.0	53.0	53.1
26 34.8	26 50.0	52.0	52.0	47 27.1	47 42.0	52.7	53.1
28 46.6	29 1.8	52.3	52.3	49 11.0	49 26.3	53.3	53.2
30 36.0	30 51.2	52.3	52.3	51 34.0	51 49.3	53.5	53.4
				53 16.4	53 31.6	53.4	53.3

NOVEMBER 27 and 28, 1849—Continued.

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire . .	10 32 45.12			Mean by second wire .	10 33 3.60		
Chronometer fast . .	56.98			Chronometer fast . .	56.98		
Sid. time	10 31 48.14	52.31	23	Sid. time	10 32 6.62	52.32	23

Mars following limb.		Mars precedes star b = 11 mag.		Mars following limb.		Mars precedes star b = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.		s.	
10 59 18.2	59 33.7	53.8	53.3	11 4 24.4	. . .	53.9	. .
11 2 27.1	2 42.0	53.9	54.2				

Remarks.

Interrupted by clouds. Observer, W. C. B.

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	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire . .	11 2 3.23			Mean by second wire .	11 1 7.85		
Chronometer fast . .	57.00			Chronometer fast . .	57.00		
Sid. time	11 1 6.23	53.87	3	Sid. time	11 0 10.85	53.75	2

NOVEMBER 30, 1849.

Mars following limb.		Mars follows Bessel 405.		Mars following limb.		Mars follows Bessel 405.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		s.		h. m. s.		s.	
0 47 17.2	. . .	13.4	. .	0 52 33.8	. . .	13.2	. .
48 15.4	. . .	13.4	. .	53 13.5	. . .	13.1	. .
49 5.5	. . .	13.3	. .	53 46.0	. . .	13.0	. .
49 40.0	. . .	13.2	. .	54 56.0	. . .	13.0	. .
50 19.5	. . .	13.2	. .	55 30.0	. . .	13.0	. .
50 51.9	. . .	13.3	. .	56 8.4	. . .	12.9	. .
51 28.1	. . .	13.3	. .	56 47.8	. . .	13.0	. .
52 1.3	. . .	13.3	. .				

	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	0 52 7.63		
Chronometer fast	57.16		
Sid. time	0 51 10.47	13.17	15

Observer, G. P. B.

DECEMBER 5, 1849.

Mars following limb.		Mars follows star b = 14 mag.		Mars following limb.		Mars follows star b = 14 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	m. s.	m. s.	h. m. s.	m. s.	m. s.	m. s.
0 57 29.0	57 45.5	1 16.0	1 17.0	1 20 14.9	20 31.5	1 14.7	1 15.5
59 46.9	0 3.0	1 16.8	1 16.8	22 32.4	22 48.5	1 15.0	1 15.0
1 2 0.0	2 6.0	1 16.3	1 16.5	24 45.2	25 1.1	1 15.1	1 14.7
4 20.0	36.4	1 15.9	1 16.5	27 19.0	27 35.0	1 14.5	1 14.6
6 28.0	6 44.2	1 15.8	1 16.2	29 23.0	29 39.3	1 14.1	1 14.3
8 43.0	8 59.0	1 16.2	1 16.2	31 18.3	31 34.5	1 14.1	1 14.5
10 48.9	11 5.0	1 16.0	1 16.1	33 51.8	34 8.0	1 14.6	1 14.6
13 13.8	13 29.9	1 15.8	1 15.9	36 8.8	36 24.7	1 14.1	1 14.2
15 18.3	15 34.4	1 15.3	1 15.7	38 15.9	38 31.8	1 13.8	1 14.0
17 25.8	17 41.8	1 14.9	1 15.6	40 25.0	40 41.0	1 14.0	1 14.0

DECEMBER 5, 1849—Continued.

Remarks.

The star of comparison is double, and is 1′ north of Mars.
Observer, W. C. B.

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	h. m. s.	Δ α. m. s.	No. of obs.		h. m. s.	Δ α. m. s.	No. of obs.
ean by first wire .	1 18 59.40			Mean by second wire	1 19 15.53		
Chronometer fast .	57.00			Chronometer fast .	57.00		
Sid. time	1 18 2.40	1 15.15	20	Sid. time	1 18 18.53	1 15.39	20

Mars following limb.		Mars follows star $b = 14$ mag.		Mars following limb.		Mars follows star $b = 14$ mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 56 46.5	57 2.5	13.2	13.0	2 3 19.0	3 34.9	12.3	12.2
58 54.9	59 10.8	12.1	12.7	6 19.8	6 35.9	11.9	12.1
2 1 9.8	1 25.7	12.6	12.7	8 35.3	8 51.2	12.0	12.0

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire .	2 2 30.88			Mean by second wire	2 2 46.83		
Chronometer fast .	57.00			Chronometer fast .	57.00		
Sid. time	2 1 33.88	12.35	6	Sid. time	2 1 49.83	12.45	6

DECEMBER 6, 1849.

Mars following limb.		Mars follows star $x = 10$ mag.		Mars following limb.		Mars follows star $x = 10$ mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 56 44.5	57 0.5	37.7	37.7	2 18 31.7	18 47.8	36.8	36.0
58 15.4	58 31.5	37.1	37.3	19 59.0	20 15.0	35.8	35.8
2 2 11.3	2 27.3	37.0	36.9	21 19.9	21 35.8	35.7	35.8
3 52.2	4 8.0	37.2	37.2	23 20.8	23 36.8	35.5	35.6
5 18.0	5 34.0	37.1	36.7	24 44.0	25 0.0	35.6	35.7
7 3.0	7 19.0	36.9	37.0	26 7.5	26 23.4	35.5	35.4
8 28.9	8 45.0	36.7	36.7	27 33.1	27 49.0	35.1	35.1
9 55.0	10 11.0	36.5	36.5	29 3.0	29 18.9	35.5	35.3
11 29.0	11 45.0	36.3	36.5	30 26.6	30 42.5	35.2	34.9
12 57.1	13 13.0	36.6	36.3	31 51.7	32 7.6	35.3	35.1
14 53.8	15 9.3	36.7	36.3	33 19.0	33 34.8	35.0	34.8
16 27.2	16 43.2	36.0	36.2	34 46.0	35 1.9	35.0	34.9

Remarks.

A bright star follows x by 9s., and is 8″ south of it.
Observer, W. C. B.

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	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire .	2 17 1.57			Mean by second wire	2 17 17.51		
Chronometer fast .	57.47			Chronometer fast .	57.47		
Sid. time	2 16 4.10	36.16	24	Sid. time	2 16 20.04	36.07	24

DECEMBER 6, 1849—Continued.

Mars following limb.		Mars follows star b = 14 mag.(?)		Mars following limb.		Mars follows star b = 14 mag.(?)	
First wire.	Second wire.	First wire.	Second wire.	First wire	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
2 49 9.2	49 25.0	24.3	24.7	2 56 41.7	56 57.7	24.5	24.1
50 1.7	50 17 5	24.7	24.5	58 44.0	59 0.0	23.8	24.0
52 53.0	53 9.0	23.9	24.0	3 1 17.8	1 33.8	23.6	24.1
54 57.3	55 13.2	24.1	24.0				

Remarks.

The star is the same as that used on the 5th.

Observer, W. C. B.

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	h. m. s.	Δ a. *s.*	No. of obs.
Mean by first wire .	3 54 49.24		
Chronometer fast . .	57.48		
Sid. time	2 53 51.76	24.13	7

	h. m. s.	Δ a. *s.*	No. of obs.
Mean by second wire .	2 55 5.17		
Chronometer fast . .	57.48		
Sid. time	2 54 7.69	24.20	7

Mars following limb.		Mars precedes star b = 14 mag.		Mars following limb.		Mars precedes star b = 14 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
. . .	49 25.0	. .	26.3	2 56 41.7	56 57.7	25.7	25.8
. . .	50 17.5	. .	25.5	58 44.0	59 0.0	25.8	25.6
2 52 53.0	53 9.0	25.8	25.8	3 1 17.8	1 33.8	26.5	26.4
54 57.3	55 13.2	25.5	26.5				

	h. m. s.	Δ a. *s.*	No. of obs.
Mean by first wire .	2 56 54.76		
Chronometer fast . .	57.48		
Sid. time	2 55 57.28	25.86	5

	h. m. s.	Δ a. *s.*	No. of obs.
Mean by second wire .	2 55 5.17		
Chronometer fast . .	57.48		
Sid. time	2 54 7.69	25.99	7

DECEMBER 6 and 7, 1849.

Mars following limb.		Mars precedes star b = 14 mag.		Mars following limb.		Mars precedes star b = 14 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
10 44 8.0	44 24.0	58.9	58.8	10 49 41.9	49 57.7	58.9	59.0
46 9.2	46 25.3	59.0	58.8	51 30.2	51 46.3	59.0	59.0
47 54.0	48 11.3	59.3	59.0	53 21.0	53 37.0	59.2	59.3

Remarks.

The star of comparison is the same as that used on the 5th, and called b.

Observer, W. C. B.

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	h. m. s.	Δ a. *s.*	No. of obs.
Mean by first wire .	10 48 47.38		
Chronometer fast . .	57.58		
Sid. time	10 47 49.80	59.05	6

	h. m. s.	Δ a. *s.*	No. of obs.
Mean by second wire .	10 49 3.60		
Chronometer fast . .	57.58		
Sid. time	10 48 6.02	58.98	6

DECEMBER 6 and 7, 1849.

Mars following limb.		Mars precedes star x = 10 mag.		Mars following limb.		Mars precedes star x = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
11 7 17.0	. . .	2.1	. .	11 23 40.0	23 56.0	2.0	2.10
7 57.0	. . .	1.5	. .	24 29.0	24 45.0	2.05	2.05
9 3.3	. . .	1.3	. .	25 21.0	25 37.0	2.2	2.15
9 51.0	. . .	1.4	. .	27 4.0	27 20.0	2.4	2.45
10 21.0	. . .	1.5	. .	28 19.0	28 35.0	2.5	2.55
12 9.5	12 25.5	1.5	1.5	29 41.0	29 57.0	2.5	2.55
13 11.0	13 17.0	1.35	1.5	30 34.0	30 50.0	2.65	2.55
13 51.0	14 7.0	1.6	1.55	31 22.0	31 38.0	2.7	2.65
14 42.0	14 58.0	1.5	1.5	32 41.0	32 57.0	2.65	2.65
15 29.0	15 45.0	1.55	1.55	33 52.0	34 8.0	2.6	2.85
16 19.0	16 35.0	1.55	1.5	34 40.0	34 56.0	2.9	3.00
17 46.0	18 2.0	1.65	1.6	35 22.0	35 38.0	3.05	2.05
18 39.0	18 55.0	1.6	1.6	36 24.0	36 40.0	3.05	2.15
20 39.0	20 55.0	1.55	1.6	37 6.0	37 22.0	3.15	2.10
21 22.0	21 38.0	1.75	1.7	37 48.0	38 4.0	3.15	2.25
22 11.0	22 27.0	1.9	1.9	39 4.0	39 20.0	3.2	2.10
22 56.0	23 12.0	2.0	2.05	39 53.0	40 9.0	3.1	2.15

Remarks.

Star is 3′ north of Mars, and was called x = 10 mag. December 6, P. M.
Observer, W. C. B.

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire .	11 23 33.93			Mean by second wire	11 26 20.98		
Chronometer fast .	57.58			Chronometer fast .	57.58		
Sid. time	11 22 36.35	2.15	34	Sid. time	11 25 23.40	2.27	29

DECEMBER 7, 1849.

Mars following limb.		Mars follows star = 11 mag.		Mars following limb.		Mars follows star = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
0 38 23.8	38 40.0	36.5	36.2	0 55 35.1	55 51.2	35.3	35.3
40 0.5	40 16.7	36.0	36.1	57 16.8	57 32.7	35.2	35.2
41 26.0	41 42.0	36.7	36.6	58 39.1	58 55.3	35.1	35.3
42 51.5	43 7.5	36.5	36.1	1 0 5.5	0 21.4	35.2	35.0
44 17.2	44 33.3	36.2	35.9	3 27.0	3 43.0	34.1	34.3
45 57.7	46 13.6	36.3	36.1	4 48.9	5 5.0	34.4	35.0
47 26.4	47 43.0	35.1	36.0	6 9.9	6 26.0	34.4	34.4
48 55.0	49 11.0	35.7	35.8	7 28.6	7 44.7	34.5	34.7
50 19.3	50 35.4	35.5	35.7	8 55.9	9 12.0	34.4	34.5
51 47.9	52 3.8	35.9	35.8	10 16.0	10 31.9	34.0	34.0

Remarks.

The star is 2′ north of Mars.
Observer, W. C. B.

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire .	0 54 12.45			Mean by second wire	0 54 28.47		
Chronometer fast .	57.75			Chronometer fast .	57.75		
Sid. time	0 53 14.70	35.37	20	Sid. time	0 53 30.72	35.40	20

DECEMBER 7, 1849—Continued.

Mars following limb.		Mars precedes star = 11 mag.		Mars following limb.		Mars precedes star = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 36 42.0	36 58.0	32.7	32.5	1 48 11.1	48 27.1	31.6	31.7
37 57.5	38 13.6	32.2	32.3	49 25.9	49 42.0	31.6	31.6
39 11.5	39 27.4	32.2	32.3	50 45.5	51 1.6	31.4	31.4
40 30.5	40 46.2	32.0	32.3	51 58.5	52 14.5	31.6	31.5
41 38.0	41 54.0	32.0	31.9	53 11.0	53 27.0	31.5	31.5
42 46.8	43 2.7	31.4	32.1	54 17.2	54 33.2	31.3	31.2
44 46.8	45 2.8	31.7	31.9	55 31.0	55 47.0	31.2	31.0
45 58.3	46 14.4	31.7	31.6	56 45.6	57 1.7	31.2	31.1
47 4.0	47 20.1	31.8	31.7	58 3.0	58 19.0	30.8	30.8

Remarks.

Cold and windy; images unsteady. The star of comparison is north of a red star; difference of right ascension = 2.6s. It also precedes another star of the 11th mag. by 24.5s.; difference of declination = 4′. It clouded before the morning observations.

Observer, G. P. B.

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire . .	1 47 29.12			Mean by second wire .	1 47 55.13		
Chronometer fast . .	57.75			Chronometer fast . .	57.75		
Sid. time	1 46 31.37	31.66	18	Sid. time	1 46 47.38	31.64	18

DECEMBER 8, 1849.

Mars following limb.		Mars precedes star = 11 mag.		Mars following limb.		Mars precedes star = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	m. s.	m. s.	h. m. s.	m. s.	m. s.	m. s.
2 19 12.0	19 27.9	1 8.8	1 9.1	2 29 57.6	30 13.5	1 9.9	1 9.5
21 11.7	21 27.6	1 8.9	1 9.2	31 59.8	32 15.4	1 9.6	1 9.9
23 7.9	23 24.0	1 9.1	1 9.0	34 23.3	34 39.3	1 10.2	1 10.2
25 2.8	25 19.2	1 9.2	1 9.5	36 32.2	36 48.3	1 10.3	1 10.3
27 59.2	28 15.0	1 9.3	1 9.5	39 36.5	39 52.5	1 10.6	1 10.5

Remarks.

Star of comparison is the same as that used on the 7th.

Observer, W. C. B.

	h. m. s.	Δ α. m. s.	No. of obs.		h. m. s.	Δ α. m. s.	No. of obs.
Mean by first wire . .	2 28 54.30			Mean by second wire .	2 29 10.27		
Chronometer fast . .	57.97			Chronometer fast . .	57.97		
Sid. time	2 27 56.03	1 9.59	10	Sid. time	2 28 12.30	1 9.67	10

Mars following limb.		Mars follows star = 11 mag.		Mars following limb.		Mars follows star = 11 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
2 49 50.5	50 6.5	41.4	41.4	2 53 46.1	54 2.0	41.0	41.0
51 10.9	51 26.8	41.1	41.1	55 3.0	55 19.0	40.9	40.8
52 27.7	52 43.6	41.2	41.1	56 37.2	56 53.0	40.9	40.4

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire . .	2 53 9.23			Mean by second wire .	2 53 25.15		
Chronometer fast . .	57.97			Chronometer fast . .	57.97		
Sid. time	2 52 11.25	41.08	6	Sid. time	2 52 27.18	40.97	6

DECEMBER 11, 1849.

Mars following limb.		Mars follows star = 10 mag.		Mars following limb.		Mars follows star = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
23 58 52.1	59 8.1	35.2	35.1	0 19 28.1	19 44.0	33.3	33.2
0 0 33.3	0 49.1	35.3	35.1	20 59.6	21 15.7	33.6	33.5
2 15.8	2 32.0	34.8	35.0	22 20.8	22 37.0	33.6	33.2
3 34.2	3 50.3	34.7	34.9	23 40.5	23 56.7	33.5	33.9
4 55.0	5 11.4	34.3	34.6	25 7.9	25 24.0	33.3	33.2
6 34.6	6 50.8	34.6	34.5	26 29.6	26 45.5	32.7	32.9
7 53.0	8 9.0	34.5	34.5	28 58.7	29 14.0	33.1	32.5
9 14.9	9 30.8	34.4	34.4	30 18.2	30 34.3	32.4	33.7
10 33.1	10 49.2	34.1	34.2	31 37.8	31 54.0	32.8	33.0
12 29.9	12 45.8	34.1	34.0	33 8.0	33 24.0	32.7	33.0
13 54.0	14 10.0	34.1	34.0	34 29.6	34 45.7	32.3	32.4
15 20.7	15 36.8	33.7	33.8	35 54.0	36 9.8	32.9	32.3

Remarks.

High wind. Telescope disturbed.
Observer, W. C. B.

	h. m. s.	Δ a. *s.*	No. of obs.		*h. m. s.*	Δ a. *s.*	No. of obs.
Mean by first wire	0 17 26.81			Mean by second wire	0 17 42.83		
Chronometer fast	57.70			Chronometer fast	57.70		
Sid. time	16 29.11	33.76	24	Sid. time	16 45.13	33.79	24

Mars following limb.		Mars follows star *a* = 10 mag.		Mars following limb.		Mars follows star *a* = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
1 8 19.2	8 35.2	30.2	30.1	1 20 2.8	20 18.8	29.2	29.3
9 40.4	9 56.4	29.7	29.9	21 18.6	21 34.8	29.1	29.2
10 53.0	11 9.1	30.0	30 1	22 36.9	22 52.8	29.1	29.0
11 57.9	12 14.0	29.8	29.7	23 59.5	24 14.4	29.0	27.8
13 20.0	13 36.9	29.5	29 7	25 15.8	25 31.8	28.8	28.8
14 39.8	14 55.6	29.8	29.7	26 28.0	26 44.3	28.5	28.8
15 49.9	16 6.0	29.2	29.5	27 49.5	28 5.3	29.0	28.8
17 1.5	17 17.5	29.2	29.4	29 9.0	29 25.0	28.5	28.1
18 11.8	18 27.8	29.4	29.5	30 25.8	30 41.9	28 3	28.4

Remarks.

Cold, windy, and very bad vision.
Observer, G. P. B.

	h. m. s.	Δ a. *s.*	No. of obs.		*h. m. s.*	Δ a. *s.*	No. of obs.
Mean by first wise	1 19 16.63			Mean by second wire	1 19 32.65		
Chronometer fast	57.68			Chronometer fast	57.68		
Sid. time	1 18 18.95	29.25	18	Sid. time	1 18 34.97	29.21	18

Mars following limb.		Mars precedes star *a* = 10 mag.		Mars following limb.		Mars precedes star *a* = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
1 34 11.0	34 27.0	27.9	28.0	1 38 9.9	38 25.8	27.7	27.6
35 23.8	35 40 0	28.0	27.8	39 21.5	39 37.6	27.6	28.0
36 52.1	37 8.0	27.9	28.0	40 52.0	41 8.0	27.8	27.5

	h. m. s.	Δ a. *s.*	No. of obs.		*h. m. s.*	Δ a. *s.*	No. of obs.
Mean by first wire	1 37 28.42			Mean by second wire	1 37 44.40		
Chronometer fast	57.68			Chronometer fast	57.68		
Sid. time	1 36 30.74	27.82	6	Sid. time	1 36 46.72	27.82	6

DECEMBER 11 and 12, 1849.

Mars following limb.		Mars precedes star a = 10 mag.		Mars following limb.		Mars precedes star a = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*		*s.*	*h. m. s.*	*m. s.*		*s.*
10 46 51.8	47 3.1	. . . .	13.7	10 48 25.0	48 36.8	. . . .	13.3

	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by second wire	10 47 49.95		
Chronometer fas	57.09		
Sid. time	10 46 52.86	13.50	2

Mars following limb.		Mars precedes star a = 10 mag.		Mars following limb.		Mars precedes star a = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	.	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
10 51 43.2	52 6.8	13.4	13.4	11 5 26.8	5 51.0	15.2	14.3
53 12.3	53 36.3	13.7	13.8	6 50.1	7 13.9	14.3	14.6
54 18.2	54 42.0	13.8	14.2	8 7.8	8 31.6	14.4	14.9
55 40.7	56 4.2	13.3	13.8	10 41.7	11 5.5	14.6	14.8
56 56.8	. . .	14.2	. .	11 50.3	12 14.6	14.7	14.6
57 43.6	58 7.5	14.1	13.7	13 4.3	13 28.0	14.7	14.3
11 1 11.8	1 36.0	14.2	14.3	14 4.3	14 28.6	14.9	15.4
2 56.0	3 20.0	14.3	14.5	15 39.2	. . .	15.0	. .
4 8.1	4 32.3	14.2	14.4	16 39.2	17 2.7	15.8	15.3
				18 6.3	18 29.0	14.2	15.5

	h. m. s.	Δ *a.* *s.*	No. of obs.		*h. m. s.*	Δ *a.* *s.*	No. of obs.
Mean by first wire .	11 5 10.58			Mean by second wire	11 5 26.47		
Chronometer fast .	57.08			Chronometer fast .	57.08		
Sid. time	11 4 13.50	14.89	19	Sid. time	11 4 29.39	14.46	17

Observer, W. C. B.

Mars following limb.		Mars precedes star a = 10 mag.		Mars following limb.		Mars precedes star a = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*	*m. s.*	*s.*	*s.*
11 23 47.2	. . .	15.8	. .	11 26 16.8	27 4.7	15.9	15.3
24 47.1	. . .	15.9	. .	27 46.8	28 37.0	15.3	16.0

	h. m. s.	Δ *a.* *s.*	No. of obs.		*h. m. s.*	Δ *a.* *s.*	No. of obs.
Mean by first wire .	11 25 39.48			Mean by second wire	11 27 50.85		
Chronometer fast .	57.70			Chronometer fast .	57.70		
Sid. time	11 24 41.78	15.72	4	Sid. time	11 26 53.15	15.65	2

Observer, W. C. B.

Mars following limb.		Mars precedes star a = 10 mag.		Mars following limb.		Mars precedes star a = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*		*s.*	
11 31 14.4	. . .	16.6	. .	11 34 21.3	. . .	16.4	. .
31 57.0	. . .	16.4	. .	35 4.9	. . .	16.2	. .
32 32.0	. . .	16.5	. .	35 49.9	. . .	16.1	. .
33 48.8	. . .	16.7	. .	36 19.3	. . .	16.6	. .

DECEMBER 11 and 12, 1849—Continued.

Remarks.

The star is the same as that used last night. Wind very high, and the observations bad.

Observer, G P. B.

	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	11 33 54.42		
Chronometer fast	57.08		
Sid. time	11 32 57.34	16.44	8

DECEMBER 12, 1849.

Mars following limb.		Mars follows star = 13 mag.		Mars following limb.		Mars follows star = 13 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
0 50 19.0	50 35.0	51.2	51.0	1 3 13.5	3 29.5	50.4	50.5
53 26.0	53 41.9	51.0	50.9	4 42.5	4 58.4	50.0	49.9
54 57.7	55 13.8	50.0	50.8	6 25.3	6 41.4	49.8	49.9
56 28.4	56 44.5	50.5	51.0	7 53.1	8 9.1	50.0	49.9
57 57.5	58 13.5	50.6	50.5	9 37.3	9 53.4	49.8	49.8
59 26.2	59 42.3	50.6	50.5	10 6.8	10 22.8	49.7	49.6
1 1 2.0	1 18.0	50.4	50.4				

Remarks.

The star is too faint to be well observed, being occasionally hidden by cirrus clouds. At 2*h.* the star was 3″ south of Mars' north limb.

Observer, G. P. B.

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire . .	1 1 11.95			Mean by second wire .	1 1 27.97		
Chronometer fast . .	56.83			Chronometer fast . .	56.83		
Sid. time	1 0 15.12	50.31	13	Sid. time	1 0 31.14	50.32	13

Mars following limb.		Mars follows star = 13 mag.		Mars following limb.		Mars follows star = 13 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 12 50.3	13 6.4	49.6	49.6	1 23 12.4	23 28.4	48.9	48.9
20 15.0	20 31.1	49.0	49.1	25 49.8	26 5.9	48 4	48.5
21 43.9	21 59.9	48.9	48.9				

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire . .	1 20 46 28			Mean by second wire .	1 21 2.84		
Chronometer fast . .	56.83			Chronometer fast . .	56 83		
Sid. time	1 19 49.45	48.96	5	Sid. time	1 20 6.01	49.00	5

Mars following limb.		Mars follows star = 13 mag.		Mars following limb.		Mars follows star = 13 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 33 14.6	33 30.5	48.1	48.0	1 43 33.3	43 49.3	47.3	47.4
34 44.0	35 0.0	48.0	48.0	45 42.5	45 58.5	47.1	47.0
36 14.3	36 30.3	47.8	47.8	47 13.0	47 29.3	47.0	47.3
38 38.3	38 54.3	47.8	47.7	48 44.4	49 0.4	46.9	46.9
40 21.9	40 37.3	48.1	47.3	50 22.3	50 38.2	46.8	46.7
41 59.4	42 15.2	47.5	47.2	52 25.6	52 41.7	46.6	46.7

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire . .	1 42 46.13			Mean by second wire .	1 43 2.08		
Chronometer fast . .	56.82			Chronometer fast . .	56.82		
Sid. time	1 41 49.31	47.42	12	Sid. time	1 42 5.26	47.35	12

DECEMBER 17, 1849.

Mars following limb.		Mars follows star = 8 mag.		Mars following limb.		Mars follows star = 8 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*m. s.*	*m. s.*	*h. m. s.*	*m. s.*	*m. s.*	*m. s.*
23 56 7.4	56 22.2	1 7.9	1 8.7	0 33 48.0	34 3.3	1 6.5	1 6.3
23 58 10.3	58 26.0	7.8	7.8	37 16.2	37 31.4	5.4	5.4
0 0 44.9	1 0.3	7.8	8.3	41 50.0	42 5.2	5.2	5.2
2 53.5	3 8.4	8.3	8.3	43 43.7	43 58.4	5 5	4 8
10 14.4	10 29.5	7.3	7.0	45 39.0	45 54.2	5.0	4.8
22 23 0	22 38.7	6 5	6.4	48 7.0	48 22.0	5.0	4.5
26 6.2	26 21.5	5.8	5.9	50 5.3	50 20.4	4.6	4.6
27 59.3	28 14.6	6 0	6.0	52 25.3	52 40.8	4.6	3.8
29 56.6	30 11.7	6.0	6.2	55 14.2	55 29.5	4.3	4.1
31 47.2	32 2.2	5.7	5.6				

Remarks.

The star is 2′ or 3′ north of Mars. There is a brighter star 5′ south of Mars, and 15s. preceding it. Observer, W. C. B.

	h. m. s.	Δ α. *m. s.*	No. of obs.		*h. m. s.*	Δ α. *m. s.*	No. of obs.
Mean by first wire .	0 29 11.13			Mean by second wire	0 29 26.33		
Chronometer fast .	55.20			Chronometer fast .	55.20		
Sid. time	0 28 15.93	1 6.01	19	Sid. time . . .	0 28 31.13	1 5.98	19

Mars following limb.		Mars follows star = 8.9 mag.		Mars following limb.		Mars follows star = 8.9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*m. s.*	*m. s.*	*h. m. s.*	*m. s.*	*m. s.*	*s.*
1 37 15.9	37 31.2	1 1.0	1 1.2	1 48 56.2	49 11.4	1 0.2	59.9
39 0.2	39 15.5	0.7	1.0	50 37.7	50 53.0	1 0.0	59.9
40 36 0	40 51.2	0.6	0.8	52 13.7	52 28.8	59.7	59.8
42 17.0	42 32.2	1.0	1.0	53 55.2	54 10.3	59.7	59.5
43 57.7	44 12.8	0.5	0.3	55 34.2	55 49.5	59.6	59.5
45 35.7	45 50.9	0.3	0.4	57 16.9	57 32.2	59.5	59.7
47 15.8	47 31.0	0.4	0.2	58 58.8	59 14.1	59.3	59.3

Remarks.

High wind, and the atmosphere is very much disturbed. Not a favorable night. Observer, G. P. B.

	h. m. s.	Δ α. *m. s.*	No. of obs.		*h. m. s.*	Δ α. *m. s.*	No. of obs.
Mean by first wire .	1 48 6.51			Mean by second wire	1 48 21.74		
Chronometer fast .	55.18			Chronometer fast .	55.18		
Sid. time	1 47 11.33	1 0.18	14	Sid. time	1 47 26.58	1 0.18	14

DECEMBER 17 and 18, 1849.

Mars following limb.		Mars precedes star = 8.9 mag.		Mars following limb.		Mars precedes star = 8.9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
10 57 51.3	58 1.0	18.4	18.3	11 10 0.0	10 9.4	17.5	17.6
58 56.8	59 6.3	18.4	18.6	15 19.0	15 29.0	17.0	17.0
59 51.1	60 1.0	18.2	18.2	16 15.9	16 26.0	17.0	16.7
11 0 45.1	0 55.4	17.9	17.5	17 15.0	17 24.9	17.1	16.9
1 55.7	2 5.5	18.0	18.0	18 19.8	18 29.7	17.2	16.7
2 52.0	3 1.3	18.0	18.0	19 16.3	19 26.2	17.0	17.0
4 0.4	4 9.9	18.4	17.9	20 22.2	20 31.8	17.1	17.2
5 49.0	5 58.8	17.8	17.9	22 35.2	22 45.1	17.0	16.9
6 37.2	6 47.0	17.8	17.9	24 46.4	24 56.2	17.1	17.0
7 35.0	7 45.0	18.0	18.2	30 31.3	30 40.0	15.9	16.3
8 30.9	8 40.0	18.0	18.2				

DECEMBER 17 and 18, 1849—Continued.

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	11 10 55.50			Mean by second wire .	11 11 5.21		
Chronometer fast .	55.21			Chronometer fast . .	55.21		
Sid. time	11 10 0.29	17.56	21	Sid. time	11 10 10.00	17.52	21

Observer, W. C. B.

Mars following limb.		Mars precedes star = 7 mag. (?)		Mars following limb.		Mars precedes star = 7 mag. (?)	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m s.	s.	s.	h. m. s.	m. s.	s.	s.
11 22 35.2	22 45.1	42.1	42.1	11 30 31.3	30 40.0	42.0	42.0
. . . .	24 56.2	. .	42.0				

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	11 26 33.27			Mean by second wire .	11 26 7.10		
Chronometer fast .	55.21			Chronometer fast . .	55.21		
Sid. time	11 25 38.06	42.05	2	Sid. time	11 25 11.89	42.03	3

Mars following limb.		Mars follows star = 8.9 mag.		Mars following limb.		Mars follows star = 8.9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	s.			h. m. s.		s.	
11 39 33.7	15.5	. . .	. . .	11 45 56.7	. . .	15.1	. . .
40 17.6	15.4	. . .	. . .	46 30.2	. . .	14.8	. . .
40 55.0	15.0	. . .	. . .	47 2.0	. . .	14.8	. . .
41 31.3	15.1	. . .	. . .	47 35.4	. . .	15.1	. . .
42 4.6	15.2	. . .	. . .	48 8.2	. . .	15.8	. . .
42 46.2	15.1	. . .	. . .	48 44.4	. . .	15.0	. . .
43 24.5	15.0	. . .	. . .	49 20.7	. . .	14.8	. . .
43 56.3	15.0	. . .	. . .	49 55.5	. . .	14.5	. . .
44 35.5	15.2	. . .	. . .	50 32.5	. . .	14.5	. . .
45 15.5	14 8	. . .	. . .				. . .

Remarks.

The star has a reddish tinge, but is not decidedly a red star. A star of the 6th magnitude is south, preceding the star of comparison; difference of R. A. = 30s.; difference of declination 5′. The vision is bad and the planet low in the horizon. Observer, G. P. B.

	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	11 45 9.78		
Chronometer fast	55.21		
Sid. time	11 44 14.57	15.04	19

DECEMBER 18, 1849.

Mars following limb.		Mars follows star = 9.10 mag.		Mars following limb.		Mars follows star = 8.9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 32 28.0	32 36.7	18.8	19.0	1 48 8.9	48 17.5	17.9	17.9
33 29.6	33 38.7	18.6	18.5	49 22.7	49 31.4	17.7	17.6
34 29.4	34 38 0	18.8	18.8	50 19.0	50 27.5	17.7	17.5
35 17.7	35 26.5	18.4	18.8	51 11.7	51 20.4	17.7	17.6
36 40.1	36 49.2	18.5	19.4	52 2.1	52 10.7	17.4	17.5
38 23.7	38 32.3	18.2	18.3	52 54.5	53 3.1	17.5	17.3
39 39.6	39 47 9	18.8	18.6	53 43.2	53 52.0	17.2	17.4
40 31.8	40 40.6	18.3	18 6	54 41.2	54 49.7	17 9	17.3
41 24.8	41 33.7	18.8	18.3	55 28.1	55 37.0	17.1	17.6
42 24.2	42 33.3	17.5	18.3	56 32.2	56 40.8	17.3	17.5
43 19.3	43 28.1	17.9	17 9	57 22.8	57 32.0	16.9	17.3
44 10.7	44 19.2	17.8	18.2	58 32.0	58 40.6	17.0	17.1

DECEMBER 18, 1849—Continued.

Remarks.

Good definitions. Observer, W. C. B.

	h. m. s.	Δ a. s.	No. of obs.		h m. s.	Δ a. s.	No. of obs.
Mean by first wire	1 45 56.18			Mean by second wire	1 46 5 29		
Chronometer fast	55.23			Chronometer fast	55.23		
Sid. time	1 45 1.95	17.80	24	Sid. time	1 45 10.06	18.01	24

Mars following limb.		Mars follows star = 9.10 mag.		Mars following limb.		Mars follows star = 9.10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h m. s.	m. s.	s.	s.
2 2 43 0	2 51.8	16.8	16.8	2 9 28 3	9 37.9	16.1	16.9
3 38.4	3 47.0	17.0	16.7	10 22 5	10 32.5	15.5	16.2
4 32.4	4 41.0	16.4	17.0	11 25.0	11 35.3	16.2	16.1
5 23.7	. .	16.7	. .	12 11.8	12 20.8	15.9	17.8
6 47 3	6 53.0	16.8	16.6				

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	2 7 23.71			Mean by second wire	2 7 50.39		
Chronometer fast	55.23			Chronometer fast	55.23		
Sid. time	2 6 28.48	16.32	9	Sid. time	2 6 55.16	16.76	8

Mars following limb.		Mars precedes star = 8.9 mag.		Mars following limb.		Mars precedes star = 8.9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		s.		h. m. s.		s.	
2 43 3.0	. . .	13.5	. .	2 46 36.3	. . .	13.2	. .
43 37.3	. . .	13.5	. .	47 7.6	. . .	13.3	. .
44 10.2	. . .	13.5	. .	48 0.2	. . .	13.0	. .
44 49.5	. . .	13.3	. .	48 32.3	. . .	13.2	. .
45 21.3	. . .	13.4	. .	49 6.5	. . .	13.1	. .
45 56.0	. . .	13.3	. .	49 42 6	. . .	13.0	. .

Remarks.

A star of the same magnitude with the star of comparison, follows it by 4.2s., and is 3′ south of it.
Observer, G. P. B.

	h. m s.	Δ a. s.	No. of obs.
Mean by first wire	2 46 20.23		
Chronometer fast	55.23		
Sid. time	2 45 25.00	13.27	12

Mars following limb.		Mars follows star = 9.10 mag.		Mars following limb.		Mars follows star = 9.10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		s.		h. m. s.		s.	
2 52 13.5	. . .	13 0	. .	2 56 2.8	. . .	12.7	. .
52 45.4	. . .	12.9	. .	56 44.0	. . .	12.5	. .
53 17.7	. . .	12.7	. .	57 12.7	. . .	12.6	. .
53 59.7	. . .	12.6	. .	57 46.3	. . .	12.3	. .
54 39.9	. . .	13.5	. .	58 25.4	. . .	12.5	. .
55 29.5	. . .	12.5	. .	58 58.3	. . .	12.4	. .
				59 31.2	. . .	12.2	. .

	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	2 55 55.88		
Chronometer fast	55.23		
Sid. time	2 55 0.65	12.65	13

DECEMBER 18 and 19, 1849.

Mars following limb.		Mars precedes star = 9.10 mag.		Mars following limb.		Mars precedes star = 9.10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
11 31 27.3	31 38.6	26.7	23.1	11 50 54.0	51 5.0	27.3	27.6
32 37.8	32 48.8	25.9	25.9	52 9.8	52 20.8	27.9	28.0
34 12.6	34 23.4	26.4	26.6	54 55.4	55 6.4	28.1	28.1
35 48.6	35 59.0	26.1	26.8	56 15.6	56 26.6	28.1	28.2
37 20.7	37 31.4	26.6	26.8	57 29.0	57 40.0	28.1	28.0
39 41.6	39 52.7	26.8	26.5	58 39.3	58 49.9	27.7	27.9
40 50.9	41 1.9	26.8	26.8	59 55.5	60 6.5	28.2	28.3
42 6.3	42 17.0	26 8	27.2	12 1 33.7	1 34.8	29.1	28.9
43 23 0	43 34.0	27.5	27.4	2 37.2	2 48.1	28.4	28.4
44 38.7	44 49.9	27.3	27.1	4 4.5	4 14.8	28.4	29.1
46 0.1	46 11.2	27.4	27.3	6 19.2	6 30.2	29.1	29.3
47 9.9	47 20.7	27.1	28.0	7 46.8	7 57.9	28.5	27.9

Remarks.

Star is 1′ north of Mars.

Observer, W. C. B.

N. B.—The zero of the position circle on the evening of December 18th and on the morning of the 19th, was supposed to be 180° 0′, instead of its true value, 179° 55′; the Right Ascension differences will therefore require a small correction.

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire . .	11 49 29.90			Mean by second wire .	11 49 40.86		
Chronometer fast . .	55.23			Chronometer fast . .	55.23		
Sid. time	11 48 31.67	27.51	24	Sid. time	11 48 45.63	27.59	24

DECEMBER 21, 1849.

Mars following limb.		Mars follows star = 9 mag.		Mars following limb.		Mars follows star = 9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
0 1 15.6	1 29.6	51.9	52.0	0 15 7.9	15 21.5	50.9	50.8
2 48.1	3 2 0	51.8	52.0	16 35.2	16 49.0	51.0	51.0
4 14.8	4 28.6	51.8	51.9	18 8 0	18 21.7	51.1	50.7
5 40.5	5 54.4	51.6	51.4	19 32.2	19 46.0	50.6	50.5
7 12.9	7 26.8	51.4	51.3	20 58.6	21 12.4	50.6	50.6
8 39.6	8 53.4	51.6	51.4	22 33.0	22 46 7	50.5	50.4
10 8.6	10 22.5	51.3	51.4	24 23.8	24 37.7	50.3	50.4
11 31.2	11 45.0	51.2	51.3	25 48.8	26 2.7	50.3	50.1
14 40.5	14 54 3	51.0	51.2	27 18.4	27 32.0	50.2	50.0

Remarks.

The star at 0*h.* 30*m.* is south of Mars' south limb by 47″.

Observer, G. P. B.

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire .	0 14 15.43			Mean by second wire .	0 14 29.24		
Chronometer fast . .	56.02			Chronometer fast . .	56.02		
Sid. time	0 13 19.41	51.06	18	Sid. time	0 13 33.22	51.02	18

DECEMBER 21, 1849—Continued.

Mars following limb.		Mars follows star = 10 mag.		Mars following limb.		Mars follows star = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
0 56 32.5	56 47.0	47.8	48.0	1 22 4.3	22 18.8	45.9	46.1
58 15.7	58 30.0	47.8	48.0	23 39.6	23 54.7	45.7	46.7
1 00 38.7	0 53.0	47.9	48.0	25 18.1	25 32.5	46 1	45.7
2 36.9	2 51.3	47.8	47.3	27 1.2	27 15.7	45.6	45.7
4 12.0	4 26.4	47.7	47.4	28 44.7	28 58.9	45.9	45.8
5 53.2	6 7.2	47.8	47.2	30 28.5	30 43.1	45.5	45.5
7 25.7	7 40.4	46.9	47.6	31 59.0	32 13.5	45.6	45.5
9 14.5	9 29.0	47.4	47.2	33 36.2	33 50.5	45.5	45.5
10 50.3	11 5.0	47.3	47.3	35 44.8	35 59.0	45.3	45.0
12 29.0	12 43.7	47.0	47.0	37 14.2	37 28.6	45.2	44.9
14 7.7	14 22.3	46.8	47.0	38 48.9	39 2.8	45.4	44.8
15 56.1	16 10.5	47.0	47.3	40 25.4	40 40.0	44.8	44.9

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	1 18 53.22			Mean by second wire .	1 19 7.66		
Chronometer fast . .	56.04			Chronometer fast . .	56.04		
Sid. time	1 17 57.18	46.78	24	Sid. time	1 18 11.62	46.48	24

Observer, W. C. B.

Mars following limb.		Mars follows star = 10 mag.		Mars following limb.		Mars follows star = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
1 46 34.8	46 49.4	44.5	44.8	2 6 30.0	6 44.5	43.0	42.9
48 18.7	48 33.5	44.1	44.0	8 0.4	8 15.0	43.0	43.0
49 59.1	50 13.7	44.2	44.2	9 28.5	9 43.1	42.3	42.6
52 43.9	52 58.4	43.9	43.9	11 15.8	11 30.4	42.2	42.5
53 18.9	53 33.4	43.9	43.9	12 55.0	13 9.5	42.6	42.4
54 51.0	55 5.5	43.6	43.6	14 21.5	14 36.6	42.0	42.6
56 29.0	56 43.2	43.7	43.4	16 3.4	16 17.9	42.4	42.2
57 55.0	58 9.6	43.7	43.4	17 55.6	18 10.1	42.4	42.1
59 26.9	59 41.8	43.3	43.8	19 26.5	19 41.0	41.9	42.0
2 1 23.9	1 38.9	42.9	43.5	20 59.9	21 14.4	41.9	41.9
3 1.0	3 15.3	43.2	42.8	22 35.3	22 49.8	41.3	41.5
4 26.7	4 41.5	42.9	43.3	24 5.0	24 19.8	41.8	41.8

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	2 5 30.24			Mean by second wire	2 5 44.89		
Chronometer fast . .	56.03			Chronometer fast . .	56.03		
Sid. time	2 4 34.21	42.95	24	Sid. time	2 4 48.86	43.0	24

Observer, W. C. B.

DECEMBER 27, 1849.

Mars following limb.		Mars follows star *d*.		Mars following limb.		Mars follows star *d*.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
0 6 40.5	6 51.7	18.3	18.4	0 10 10.6	10 21.5	18.0	18.0
7 9.8	7 20.2	18.1	17.7	11 48.2	11 59.0	18.2	18.0
8 12.0	8 22.7	17.7	18.1	12 54.0	13 5.0	18.0	18.0
9 9.0	9 19.3	18.0	18.0				

DECEMBER 27, 1849—Continued.

Remarks.

Four stars of comparison were used on this night: $a = 13$ mag., 1′ south of Mars' centre at 1*h.* 40*m.*; $b = 7.8$ mag., Bessel 405; $c = 8.9$ mag., 2′ north of Mars; $d = 13$ mag. ? 3′ south. The star a was best situated and was most observed, but it was too faint to be well observed.

Observer, W. C. B.

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	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	0 9 26.30		
Chronometer fast . .	58.28		
Sid. time	0 8 28.02	18.03	7

	h. m. s.	Δ a. s.	No. of obs.
Mean by second wire .	0 9 37.06		
Chronometer fast . .	58.28		
Sid. time	0 8 38.78	18.02	7

Mars following limb.		Mars follows star a.		Mars following limb.		Mars follows star a.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
0 22 26.8	22 41.7	51.0	51.7	1 2 29.8	2 44.4	49.1	49.2
26 33.0	26 47.2	51.5	50.9	6 38.0	6 52.7	49.0	49 2
38 29.8	38 44.7	50.6	50.9	10 39.5	10 54 0	49.0	48.9
42 33.2	42 48.0	50.2	50.6	14 37.7	14 52.5	48.3	48.5
46 25.3	46 40.0	50.2	50.5	18 26.6	18 41.5	47.8	48.4
50 22.0	50 37.2	49.6	49.9	22 30.0	22 44.5	48.1	48.0
54 9.8	54 21.9	49.7	49.9	26 17.8	26 32.5	47.6	47.5
58 39.0	58 53.8	49.6	49.8				

	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire .	0 57 25.22		
Chronometer fast . .	58.28		
Sid. time	0 56 26.94	49.12	15

	h. m. s.	Δ a. s.	No. of obs.
Mean by second wire .	0 57 39.97		
Chronometer fast . .	58.28		
Sid. time	0 56 41.69	49.54	15

Mars following limb.		Mars precedes star c.		Mars following limb.		Mars precedes star c.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
0 38 29.8	38 44.7	38.4	37.5	1 6 38.0	6 52.7	40.0	39.8
42 33.2	42 48.0	38.9	38.4	10 39.5	10 54.0	39.6	40.0
46 25.3	46 40.0	38.7	38.3	14 37.7	14 52.5	40.3	40.1
50 22.0	50 37.2	39.0	38.9	18 26.6	18 41.5	41.0	40.7
54 9.8	54 24.9	39.7	38.1	22 30.0	22 44.5	40.3	40.9
58 39.0	58 53.8	39.3	39.0	26 17.8	26 32.5	41.2	41.2
1 2 29.8	2 44.4	39.4	39.4				

	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire. .	1 2 29.12		
Chronometer fast . .	58.28		
Sid. time	1 1 30.24	39.68	13

	h. m. s.	Δ a. s.	No. of obs.
Mean by second wire .	1 2 43.90		
Chronometer fast . .	58.28		
Sid. time	1 1 45.62	39.42	13

Mars following limb.		Mars precedes star b.		Mars following limb.		Mars precedes star b.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	m. s.	m. s.	h. m. s.	m. s.	m. s.	m. s.
0 22 26.8	22 41.7	1 4.0	1 3.8	1 2 29.8	2 44.4	1 6.7	1 5.6
26 33.0	26 47.2	4.1	4.7	6 38.0	6 52.7	7.0	6.8
38 29.8	38 44.7	5.2	5.0	10 39.5	10 54 0	6.8	6.9
42 33.2	42 48.0	5.7	5.3	14 37.7	14 52.5	7.3	7.0
46 25.3	46 40.0	5.8	5.8	18 26.6	18 41.5	7.7	7.7
50 22.0	50 37.2	6.0	5.8	22 30.0	22 44.5	7.7	7.5
54 9.8	54 24.9	6.5	5.3	26 17.8	26 32.5	7.9	8.3
. . .	58 53.8	. .	6.0				

	h. m. s.	Δ a. m. s.	No. of obs.
Mean by first wire .	0 57 19.95		
Chronometer fast . .	58.28		
Sid. time	0 56 21.67	1 6.31	14

	h. m. s.	Δ a. m. s.	No. of obs.
Mean by second wire .	0 57 39.97		
Chronometer fast . .	58.28		
Sid. time	0 56 41.69	1 6.10	15

DECEMBER 27, 1849—Continued.

Mars following limb.		Mars follows star *a*.		Mars following limb.		Mars follows star *a*.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
2 5 21.3	5 34.7	45.3	45.2	2 17 48.0	18 1.2	44.3	44.2
6 45.2	6 58.5	45.2	45.1	19 13.9	19 27.0	44.4	44.5
8 11.5	8 24.2	45.0	44.7	20 47.0	21 0.0	44.2	44.0
9 40.2	9 53.3	44.8	44.7	22 12.5	22 25.5	44.0	44.1
11 1.5	11 14.8	44.7	44.8	23 29.4	23 42.7	43.9	44.3
12 20.8	12 34.0	44.8	44.6	25 6.3	25 19.5	43.9	44.0
13 40.9	13 54.0	44 7	44.5	26 28.0	26 41.1	43.8	43.8
15 5.3	15 18.4	44.5	44.4	28 2.4	28 15.5	43.4	43.5
16 25.8	16 39.0	44.5	44.5	29 22.9	29 36.1	43.6	43.6

	h. m. s.	Δ *a.* *s.*	No. of obs.		*h. m. s.*	Δ *a.* *s.*	No. of obs.
Mean by first wire . .	2 17 16.83			Mean by second wire .	2 17 29.97		
Chronometer fast . .	58.30			Chronometer fast . .	58.30		
Sid. time	2 16 18.53	44.39	18	Sid. time	2 16 31.67	44.36	18

DECEMBER 27 and 28, 1849.

Mars following limb.		Mars follows star *a*.		Mars following limb.		Mars follows star *a*.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*		*s.*	
11 32 24.3	. . .	8.5	. .	11 41 14.8	. . .	7.4	. .
33 23.4	. . .	7.9	. .	41 31.4	. . .	7.4	. .
33 49.2	. . .	7.9	. .	41 49.8	. . .	7.4	. .
34 26.8	. . .	7.4	. .	42 12.0	. . .	7.4	. .
34 46.8	. . .	7.8	. .	42 27.5	. . .	7.2	. .
35 3.3	. . .	8.0	. .	42 51.2	. . .	7.4	. .
35 22.4	. . .	8.0	. .	43 17.0	. . .	7.5	. .
35 44.3	. . .	7.8	. .	43 33.4	. . .	7.4	. .
36 3.9	. . .	7.7	. .	43 50.0	. . .	7.1	. .
36 25.0	. . .	8.0	. .	44 16.2	. . .	7.4	. .
36 46.0	. . .	7.6	. .	45 27.9	. . .	7.4	. .
37 11.2	. . .	7.6	. .	46 2.0	. . .	7.2	. .
37 28.3	. . .	7.8	. .	46 32.9	. . .	7.4	. .
37 56.7	. . .	7.7	. .	46 50.0	. . .	7.5	. .
39 54.7	. . .	7.7	. .	47 3.9	. . .	7.4	. .
40 17.3	. . .	7.5	. .	47 21.0	. . .	7.0	. .
40 41.0	. . .	8.1	. .				

Remarks.

The stars of comparison are the same as those used on the 27th.

Observer, W. C. B.

	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by first wire	11 40 7.53		
Chronometer fast	58.50		
Sid. time	11 39 9.03	7.59	33

Mars following limb.		Mars follows star *a*.		Mars following limb.		Mars follows star *a*.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
11 45 8.0	. . .	6.6	. .	12 0 15.7	0 30.2	6.2	6.3
50 58.2	51 12.8	5.8	6.3	4 33.0	4 48.2	5.1	5.7
55 40.8	55 56.2	5.4	6.2				

DECEMBER 27 and 28, 1849—Continued.

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire .	0 57 19.14			Mean by second wire .	0 58 6.85		
Chronometer fast . .	58.50			Chronometer fast . .	58.50		
Sid. time	0 56 20.64	5.82	5	Sid. time	0 57 8.35	6.12	4

Mars following limb.		Mars precedes star *d*.		Mars following limb.		Mars precedes star *d*.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
11 55 40.8	55 56.2	28.7	27.2	12 16 31.3	16 45.5	28.7	29.2
12 0 15.7	0 30.2	28.7	28.6	20 6.2	20 21.0	29.1	29.0
10 40.4	10 55.2	28.8	28.6	27 1.0	27 16.4	30.0	30.0

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire . .	12 11 42.57			Mean by second wire .	12 11 57.42		
Chronometer fast . .	58.50			Chronometer fast . .	58.50		
Sid. time	12 10 44.07	29.00	6	Sid. time	12 11 58.92	28.77	6

Mars following limb.		Mars follows star *c* = 9 mag.		Mars following limb.		Mars follows star *c* = 9 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
11 50 58.2	51 12.8	21.6	21.4	12 10 40.4	10 55.2	22.3	23.2
55 40.8	55 56.2	22.5	21.8	16 31.3	16 45.5	22.7	23.6
12 0 15.7	0 30.2	22.0	22.2	20 6.2	20 21.0	23.6	23.6
4 33.0	4 48.2	22.4	22.2	27 1.0	27 16.4	23.8	23.8

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire .	12 9 28.32			Mean by second wire .	12 9 43.19		
Chronometer fast . .	58.50			Chronometer fast . .	58.50		
Sid. time	12 8 29.82	22.61	8	Sid. time	12 8 44.69	22.72	8

Mars following limb.		Mars precedes star *b*.		Mars following limb.		Mars precedes star *b*.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
11 50 58.2	51 12.8	21.6	21.4	12 10 40.4	10 55.2	22.3	23.2
55 40.8	55 56.2	22 5	21.8	16 31.3	16 45.5	22.7	23.6
12 0 15.7	30.2	22.0	22.2	20 6.2	20 21.0	23.6	23.6
4 33.0	4 48.2	22.4	22.2	27 1.0	27 16.4	23.8	23.8

	h. m. s.	Δ α. s.	No. of obs.		h. m. s.	Δ α. s.	No. of obs.
Mean by first wire .	12 9 28.32			Mean by second wire .	12 9 43.19		
Chronometer fast . .	58.50			Chronometer fast . .	58.50		
Sid. time	12 8 29.82	22.61	8	Sid. time	12 8 44.69	22.72	8

DECEMBER 28, 1849.

Mars following limb.		Mars follows star = 8 mag.		Mars following limb.		Mars follows star = 8 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
0 45 19.3	. . .	17.6	. .	1 2 4.5	2 15.2	16.0	16.8
. . .	47 13.0	. .	17.2	3 11.3	. . .	16.7	. .
49 14.3	49 24.3	17.4	17.5	4 52.4	5 1.7	17.1	16.9
50 17.0	50 28.0	16.5	17.5	8 15.2	8 24.2	16.9	16.3
51 19.8	51 29.7	17.4	17.7	9 6.0	9 15.3	16.0	15.8
52 14.3	52 24.2	17.1	16.9	10 0.5	10 10.0	16.1	16.0
53 11.3	53 21.6	16.6	16.8	10 47.0	10 56.7	15.9	16.2
54 8.3	. . .	16.2	. .	11 40.0	11 50.0	16.0	16.3
59 19.7	59 29.7	16.7	16.7	. . .	13 58.0	. .	16.0
1 0 16.0	26.3	16.5	16.3				
1 8.8	1 19.0	16.5	16.8				

Remarks.

The star is 4′ south of Mars.

Observer, W. C. B.

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	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire . .	0 59 48.09		
Chronometer fast . .	58.78		
Sid. time	0 58 49.31	16.62	18

	h. m. s.	Δ a. s.	No. of obs.
Mean by second wire .	1 1 2.23		
Chronometer fast . .	58.78		
Sid. time	1 0 3.45	16.69	17

Mars following limb.		Mars follows star = 8 mag.		Mars following limb.		Mars follows star = 8 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*		*s.*	
1 15 26.0	. . .	16.0	. .	1 28 25.0	. . .	14.5	. .
16 22.2	. . .	15.9	. .	29 5.4	. . .	15.0	. .
17 20.1	. . .	15.7	. .	29 46.0	. . .	15.1	. .
18 0.0	. . .	15.5	. .	30 28.1	. . .	14.8	. .
18 37.2	. . .	15.3	. .	31 7.0	. . .	14.7	. .
19 33.2	. . .	15.7	. .	31 45.0	. . .	15.2	. .
20 13.3	. . .	15.3	. .	32 23.3	. . .	14.8	. .
20 54.4	. . .	15.4	. .	33 4.4	. . .	14.6	. .
21 33.0	. . .	15.7	. .	33 45.5	. . .	14.5	. .
22 10.4	. . .	15.3	. .	34 24.1	. . .	14.7	. .
22 59.8	. . .	15.4	. .	35 1.5	. . .	14.5	. .
23 45.0	. . .	15.0	. .	36 1.3	. . .	14.6	. .
24 26.0	. . .	15.6	. .	36 49.6	. . .	14.6	. .
25 6.8	. . .	15.5	. .	37 35.0	. . .	15.0	. .

	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	1 26 43.17		
Chronometer fast	58.78		
Sid. time	1 25 44.39	15.14	28

DECEMBER 28, 1849—Continued.

Mars following limb.		Mars follows star = 8 mag.		Mars following limb.		Mars follows star = 8 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		*s.*		*h. m. s.*		*s.*	
1 51 43.0	. . .	13.1	. .	2 5 24.9	. . .	12.7	. .
55 51.5	. . .	13.4	. .	6 2.5	. . .	12.6	. .
57 19.4	. . .	13.2	. .	6 45.0	. . .	12.5	. .
59 4.3	. . .	13.4	. .	7 23.3	. . .	12.3	. .
59 58.6	. . .	12.6	. .	8 29.0	. . .	12.6	. .
2 0 57.8	. . .	12.8	. .	9 9.5	. . .	12.5	. .
1 56.9	. . .	12.8	. .	9 51.5	. . .	12.1	. .
3 16.0	. . .	13.0	. .	10 40.5	. . .	12.5	. .
4 4.0	. . .	12.4	. .	11 42.3	. . .	12.3	. .
4 43.0	. . .	13.0	. .	13 8.1	. . .	12.2	. .

	h. m. s.	Δ *a.* *s.*	No. of obs.
Mean by first wire	2 4 24.50		
Chronometer fast	58.78		
Sid. time	2 3 25.72	12.70	20

DECEMBER 29 and 30, 1849.

Mars following limb.		Mars follows star *a* = 8 mag.		Mars following limb.		Mars follows star *a* = 8 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
11 20 31.0	20 44.0	18.8	19.0	11 45 59.4	46 12.7	17.8	18.1
22 49.3	23 1.8	19.7	18.8	48 4.5	48 17.8	17.6	17.9
25 0.9	25 14.1	18.9	19.3	50 13.0	50 26.2	17.8	18.0
27 9.0	27 22.0	17.8	18.5	54 17.8	54 31.0	17.8	17.9
29 47.8	30 0.7	19.1	18.9	56 16.2	56 29.2	17.4	17.2
31 58.0	32 11.0	18.8	18.8	58 37.3	58 50.5	17.4	17.5
34 34.7	34 48.0	18.9	19.0	12 0 44.0	57.3	17.5	17.3
36 40.0	36 53.0	19.0	18.7	3 59.6	4 12.8	18.2	17.3
38 45.7	38 59.0	18.6	18.6	6 4.2	6 17.2	16.9	16.8
41 38.6	41 52.0	18.3	18.7	8 9.0	8 22.0	17.0	16.7
43 50.5	44 3.7	18.3	18.4				

Remarks.

Two stars (*a* and *b*) were used at 11*h.* 20*m.*; *a* was north of Mars' north limb by 4′, and *b* by 3′.
Observer, W. C. B.

	h. m. s.	Δ *a.* *s.*	No. of obs.		*h. m. s.*	Δ *a.* *s.*	No. of obs.
Mean by first wire .	11 44 3.36			Mean by second wire .	11 44 16.48		
Chronometer fast . .	59.05			Chronometer fast . .	59.05		
Sid. time	11 43 5.31	18.28	21	Sid. time	11 43 17.43	17.88	21

Mars following limb.		Mars follows star *b* = 15 mag.		Mars following limb.		Mars follows star *b* = 15 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
. . . .	20 44.0	. .	29.1	11 45 59.4	46 12.7	27.8	27.3
11 22 49.3	23 1.8	29.7	29.1	48 4.5	48 17.8	27.7	27.8
25 0.7	25 14.1	29.5	29.1	50 13.0	50 26.2	27.6	27.2
27 9.0	27 22.0	29.0	28.7	54 17.8	54 31.0	27.6	27.5
29 47.8	30 0.7	29.2	28.7	56 16.2	56 29.2	27.2	27.1
31 58.0	32 11.0	28.9	29.0	58 37.3	58 50.5	27.3	27.5
34 34.7	34 48.0	28.5	29.0	12 0 44.0	0 57.3	26.8	27.0
36 40.0	36 53.0	28.5	28.3	3 59.6	3 12.8	26.8	26.8
38 45.7	38 59.0	28.6	28.2	6 4.2	6 17.2	26.8	26.2
41 38.6	41 52.0	28.1	28.6	8 9.0	8 22.0	26.6	26.5
43 50.5	44 3.7	28.2	28.2				

DECEMBER 29 and 30, 1849—Continued.

	h. m. s.	Δ a. s.	No of obs.		h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	11 45 13.97			Mean by second wire	11 44 16.48		
Chronometer fast	59.05			Chronometer fast	59.05		
Sid. time	11 44 14.92	28.02	20	Sid. time	11 43 17.43	27.95	21

DECEMBER 30, 1849.

Mars following limb.		Mars follows star $a = 8$ mag.		Mars following limb.		Mars follows star $a = 8$ mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	s.	s.	h. m. s.	m. s.	s.	s.
0 56 58.0	57 10.2	33.7	33.2	1 15 54.1	16 6.5	32.1	32.3
58 30.3	58 42.5	33.4	33.3	18 11.9	18 24.2	32.1	32.0
1 0 2.1	0 14.3	33.1	33.0	20 27.8	20 40.0	31.8	31.8
1 19.9	1 32.6	32.8	33.3	21 47.0	21 59.2	31.9	31.7
2 33.7	2 46.0	33.4	33.0	23 9.0	23 21.2	31.8	31.5
4 4.8	4 17.1	32.8	32.9	24 45.3	24 57.5	31.8	32.2
5 27.4	5 39.9	32.6	32.9	26 14.5	26 26.7	31.3	31.5
7 31.4	7 43.9	32.6	32.8	27 33.3	27 45.5	31.4	31.5
8 57.5	9 9.8	32.6	32.5	28 50.2	29 2.3	31.6	31.3
10 43.1	10 55.5	32.8	32.6	30 10.5	30 22.7	30.9	31.4
12 9.3	12 21.5	32.3	32.3	32 2.7	32 15.0	31.4	31.8
14 2.4	14 14.3	31.9	32.0	33 44.8	. . .	30.8	. .

Remarks.

The star is 4′ north of Mars.

Observer, W. C. B.

	h. m. s.	Δ a. s.	No. of obs.		h. m. s.	Δ a. s.	No. of obs
Mean by first wire	1 15 12.96			Mean by second wire	1 14 36.89		
Chronometer fast	59.10			Chronometer fast	59.10		
Sid. time	1 14 13.86	32.20	24	Sid. time	1 13 37.79	32.20	23

DECEMBER 31, 1849.

Mars following limb.		Mars precedes Bessel 405.		Mars following limb.		Mars precedes Bessel 405.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		s.		h. m. s.		s.	
6 39 59.8	. . .	15.7	. .	6 50 32.3	. . .	15.7	. .
43 27.6	. . .	15.4	. .	51 36.8	. . .	15.9	. .
44 20.7	. . .	15.8	. .	52 13.3	. . .	15.8	. .
45 18.8	. . .	15.7	. .	52 52.0	. . .	16.0	. .
46 42.4	. . .	16.2	. .	53 30.0	. . .	16.1	. .
47 21.7	. . .	15.8	. .	54 8.9	. . .	16.2	. .
47 59.5	. . .	15.6	. .	54 50.5	. . .	16.1	. .
48 39.0	. . .	15.9	. .	55 34.5	. . .	16.2	. .
49 20.5	. . .	15.7	. .	58 11.6	. . .	16.4	. .
49 54.5	. . .	15.7	. .	58 51.8	. . .	16.2	. .

Remarks.

Seen through openings in the clouds.

Observer, G. P. B.

	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	6 50 10.31		
Chronometer fast	59.18		
Sid. time	6 49 11.13	15.92	20

JANUARY 1, 1850.

Mars following limb.		Mars precedes Bessel 405.		Mars following limb.		Mars precedes Bessel 405.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	m. s.	m. s.	h. m. s.	m. s.	m. s.	m. s.
0 8 55.3	9 7.0	1 11.3	1 11.3	0 34 35.8	34 47.6	1 12.4	1 12.6
10 51.4	11 2.9	10.9	11.4	36 30.3	36 42.0	13.2	13.0
12 56.0	13 7.8	11.4	11.7	1 16 12.2	16 23.9	15.1	15.1
14 45.5	14 57.2	11.5	11.6	18 18.2	18 30.0	14 8	15.1
16 35.3	16 47.0	11.9	11.6	20 17.9	20 30.0	15.1	15.0
19 26.7	19 38.5	12.0	12.0	22 11.5	22 23.3	15.5	15.7
21 16.8	21 28.5	11.7	12.0	24 32.1	24 44.0	15.8	15.4
23 6.6	23 18.4	11.9	12.1	26 32.2	26 43.7	15.6	15.3
27 10.4	27 21.8	12.2	12.7	28 21.2	28 33.3	15.8	15.9
28 57.0	29 8.6	12.2	12.4	30 14.3	30 26.0	15.9	16.0
30 47.0	30 59.0	12.1	12.2	32 15.0	32 26.7	16.0	16.3
32 42.0	32 53.4	12.9	12.6	34 15.2	34 27.0	16.2	16.0

	h. m. s.	Δ a. m. s.	No. of obs.		h. m. s.	Δ a. m. s.	No. of obs.
Mean by first wire . .	0 45 24.41			Mean by second wire .	0 45 35.00		
Chronometer fast . .	59.37			Chronometer fast . .	59.37		
Sid. time	0 44 25.04	1 13.47	24	Sid. time	0 44 35.63	1 13.54	24

Observer, W. C. B.

JANUARY 1 and 2, 1850.

Mars following limb.		Mars precedes Bessel 405.		Mars following limb.		Mars precedes Bessel 405.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	m. s.	m. s.	h. m. s.	m. s.	m. s.	m. s.
11 4 11.5	4 30.3	1 47.7	1 47.8	11 20 58.3	21 17.0	1 48.5	1 48.5
6 41.5	7 0.1	47.7	47.7	22 34.7	22 53.5	48.7	48.4
9 18.7	9 37.5	47.8	48.0	25 8.5	25 27.3	49.0	49.0
12 3.0	12 21.7	48.1	48.3	27 54.9	28 13.8	49.1	48.9
14 36.6	14 55.3	48.3	48.2	30 36.4	30 55.4	48.9	49.1
17 17.0	17 35.8	48.3	48.3	33 12.5	33 31.4	49.3	49.1

Remarks.

A star of the 7th magnitude follows the star of comparison by 30s. and is 9′ north of it.

Observer, G. P. B.

	h. m. s.	Δ a. m. s.	No. of obs.		h. m. s.	Δ a. m. s.	No. of obs.
Mean by first wire . .	11 18 42.63			Mean by second wire .	11 19 1.59		
Chronometer fast . .	59.50			Chronometer fast . .	59.50		
Sid. time	11 17 43.13	1 48.45	12	Sid. time	11 18 2.09	1 48.44	12

Mars following limb.		Mars precedes Bessel 405.		Mars following limb.		Mars precedes Bessel 405.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	m. s.	m. s.	m. s.	h. m. s.	m. s.	m. s.	m. s.
11 36 27.8	36 56.5	1 49.2	1 48.8	11 53 38.0	53 56.7	1 50.3	1 50.3
39 36.0	39 54.7	49.4	49.6	56 39.0	56 57.9	50.6	50.4
42 21.1	42 39.8	49.5	49.7	59 21.0	59 40.0	50.8	50.5
45 6.3	45 25.0	49.7	48.8	12 2 38.5	2 57.5	50.7	. .
50 53.2	51 12.0	50.3	50.2				

	h. m. s.	Δ a. m. s.	No. of obs.		h. m. s.	Δ a. m. s.	No. of obs.
Mean by first wire . .	11 47 24.45			Mean by second wire .	11 48 20.32		
Chronometer fast . .	59.50			Chronometer fast . .	59.50		
Sid. time	11 46 25.04	1 50.01	9	Sid. time	11 47 20.82	1 49.78	8

JANUARY 4, 1850.

Mars following limb.		Mars precedes Bessel 523.		Mars following limb.		Mars precedes Bessel 523.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*s.*	*s.*	*h. m. s.*	*m. s.*	*s.*	*s.*
0 52 32.2	52 44.3	56.2	56.4	1 16 11.0	16 23.1	57.4	57.7
54 11.2	54 23.1	56.3	56.1	17 55.5	18 7.7	57.5	57.7
56 6.0	56 18.4	56.7	56.6	19 34.2	19 46.8	57.8	57.7
58 17.0	58 29.4	56.5	56.3	21 13.1	21 25 5	57.9	57.7
59 55.0	0 7.1	56.7	56.7	22 59.6	23 12.0	57.7	57.6
1 1 35.5	1 47.0	56.8	57.5	28 30.9	28 43.2	58.1	58.0
3 34.6	3 47.1	56.2	56.9	30 21.0	30 33.2	58.0	58.2
5 25.4	5 37.6	56.6	56.9	32 12.6	32 25.0	58.4	58.2
7 1.2	7 13.3	56.8	57.1	34 2.0	34 14.4	58.4	58.1
8 43.9	8 56.2	57.1	56.9	35 42.1	35 54.2	58.0	58.6
10 23.2	10 35.5	56.8	57.0	37 27.5	37 40.0	58.5	58.6
11 59.5	12 11.9	57.4	57.1	39 7.5	39 19.5	58.5	58.5
14 24.4	14 37.0	57.6	57.0				

	h. m. s.	Δ α. *s.*	No. of obs.		*h. m. s.*	Δ α. *s.*	No. of obs.
Mean by first wire . .	1 15 10.64			Mean by second wire .	1 15 22.90		
Chronometer fast . .	1 0.60			Chronometer fast . .	1 0 60		
Sid. time	1 14 10.04	57.36	25	Sid. time	1 14 22.30	57.40	25

Observer, W. C. B.

JANUARY 4 and 5, 1850.

Mars following limb.		Mars precedes Bessel 523.		Mars following limb.		Mars precedes Bessel 523.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*m. s.*	*m. s.*	*h. m. s.*	*m. s.*	*m. s.*	*m. s.*
11 18 25.3	18 39.4	1 27.3	1 26.7	11 45 14.7	45 28.4	1 27.8	1 28.3
20 45.9	21 0.0	27.0	26.7	47 26.0	47 39.8	28.0	28.0
23 5.4	23 19.3	27.2	27.2	49 33.0	49 46.8	28.2	28.2
25 31.0	25 45.0	27.0	27.0	51 33.5	51 47.3	28.5	28.5
27 58.5	28 12.5	27.5	27.5	53 44.6	53 58.5	28.2	28.5
30 5.9	30 19.7	27.2	27.3	56 8.6	56 22.3	29.3	28.9
32 12.7	32 26.4	27.4	27.6	58 36.6	58 50.5	29.2	28.5
34 19.5	34 33.7	27.7	27.3	12 0 42.0	0 56.0	28.5	28.5
36 35.0	36 49.0	27.8	27.7	2 47.6	3 0.1	28.5	29.9
38 44.0	38 58.0	27.9	27.8	5 2.3	5 16.2	29.1	29.3
40 55.4	41 8.9	27.6	28.4	8 15.0	8 29.0	29.4	29.3
43 4.5	43 18.2	28.0	28.3				

	h. m. s.	Δ α. *m. s.*	No. of obs.		*h. m. s.*	Δ α. *m. s.*	No. of obs.
Mean by first wire .	11 43 4.65			Mean by second wire	11 43 18.39		
Chronometer fast .	1 0.74			Chronometer fast .	1 0.74		
Sid. time	11 42 3.91	1 28.02	23	Sid. time	11 42 17.65	1 28.06	23

Observer, W. C. B.

JANUARY 5, 1850.

Mars following limb.		Mars precedes Bessel 523.		Mars following limb.		Mars precedes Bessel 523.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.	*m. s.*	*m. s.*	*m. s.*	*h. m. s.*	*m. s.*	*m. s.*	*m. s.*
0 21 51.8	22 5.5	2 0.8	2 1.0	0 31 23.2	31 37.8	2 1.5	2 1.1
25 13.9	25 27.8	1.0	0.7	35 58.8	36 11.8	1.7	1.8
28 8.9	28 22.1	1.1	1.7	38 14.8	38 28.6	1.7	1.9

	h. m. s.	Δ α. *m. s.*	No. of obs.		*h. m. s.*	Δ α. *m. s.*	No. of obs.
Mean by first wire .	0 30 8.57			Mean by second wire	0 35 22.27		
Chronometer fast .	1 0.88			Chronometer fast .	1 0.88		
Sid. time	0 29 7.69	2 1.30	6	Sid. time	0 34 21.39	2 1.37	6

Observer, W. C. B.

JANUARY 10 and 11, 1850.

Mars following limb.		Mars precedes star = 10 mag.		Mars following limb.		Mars precedes star = 10 mag.	
First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.	First wire.	Second wire.
h. m. s.		s.		h. m. s.		s.	
9 56 50.0	. . .	14.9	. .	10 13 32.2	. . .	16.0	. .
57 43.9	. . .	15.6	. .	14 18.8	. . .	16.2	. .
58 33.9	. . .	15.6	. .	15 12.5	. . .	16.1	. .
59 26.0	. . .	16.0	. .	16 6.0	. . .	16 3	. .
10 0 9.0	. . .	16.0	. .	16 58.2	. . .	16.3	. .
3 50.0	. . .	15.7	. .	17 40.9	. . .	16.1	. .
4 43.5	. . .	15.5	. .	18 42.1	. . .	16.6	. .
5 37.1	. . .	16.4	. .	20 26.3	. . .	16.5	. .
6 19.4	. . .	16.1	. .	21 20.8	. . .	16.8	. .
7 3.5	. . .	15.6	. .	22 16.9	. . .	16.3	. .
7 49.1	. . .	15.9	. .	23 11.8	. . .	16.7	. .
8 35.0	. . .	16.0	. .	24 1.4	. . .	16.6	. .
9 19.5	. . .	16.5	. .	25 24.0	. . .	16.6	. .
10 7.1	. . .	15.7	. .	27 1.3	. . .	16.7	. .
10 54.7	. . .	16.0	. .	28 16.5	. . .	17.0	. .
12 3.1	. . .	15.8	. .	29 5.5	. . .	16.8	. .
12 47.0	. . .	16.0	. .				

Remarks.

The star is south of Mars, and is the same as used for micrometer measurements of the 10th P. M.

Observer, W. C. B.

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	h. m. s.	Δ a. s.	No. of obs.
Mean by first wire	10 12 53.55		
Chronometer fast	1 0.70		
Sid. time	10 11 52.85	16.14	33

RIGHT ASCENSIONS OF MARS, BY MICROMETER.

NOVEMBER 30, 1849.

Mars following limb precedes Bessel 405.		Mars following limb precedes Bessel 405.		Mars following limb precedes Bessel 405.		Mars following limb precedes Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
2 29 20	39.42	2 36 50	40.04	2 46 20	40.73	2 54 12	41.26
31 10	.57	39 40	.31	47 48	.74	55 46	.42
32 15	.64	41 15	.28	49 10	.85	56 55	.59
33 35	.72	42 28	.46	50 25	41.03	58 20	.64
35 23	.86			52 40	.13		

	h. m. s.	$\Delta\,\alpha \cos.\,\delta.$ ′ ″	Micr. *Rev.*	No. of obs.
Mean	2 35 46.22	1 38.76	39.922	
Chronometer fast	57.16	— 0.04	Zero, 50.000	
Sid. time . . .	2 34 49.06	1 38.72	10.078	9

Ext. ther. 35°.

	h. m. s.	$\Delta\,\alpha \cos.\,\delta.$ ′ ″	Micr. *Rev.*	No. of obs.
Mean	2 52 24.00	1 26.87	41.154	
Chronometer fast	57.16	— 0.03	Zero, 50.000	
Sid. time . . .	2 51 26.84	1 26.84	8.846	9

Observer, G. P. B.

Mars following limb precedes Bessel 405.		Mars following limb precedes Bessel 405.		Mars following limb precedes Bessel 405.		Mars following limb precedes Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
3 8 5	57.50	3 18 20	56.57	3 29 4	55.75	3 41 10	54.93
10 55	.27	20 12	.49	31 14	.62	42 43	.75
13 25	.10	21 59	.27	36 35	.23	44 43	
14 52	56.89	23 58	.21	38 28	.07		
17 0	.72						

	h. m. s.	$\Delta\,\alpha \cos.\,\delta.$ ′ ″	Micr. *Rev.*	No. of obs.
Mean	3 16 31.78	1 6.44	56.780	
Chronometer fast	57.16	— 0.03	Zero, 50.000	
Sid. time . . .	3 15 34.62	1 6.41	6.780	9

Ext. ther., 35°.

	h. m. s.	$\Delta\,\alpha \cos.\,\delta.$ ′ ″	Micr. *Rev.*	No. of obs.
Mean	3 37 42.43	0 50.50	55.153	
Chronometer fast	57.16	— 0.02	Zero, 50.000	
Sid. time . . .	3 36 45.27	0 50.48	5.153	7

Observer, W. C. B.

NOVEMBER 30 and 31, 1849.

Mars following limb follows Bessel 405.		Mars following limb follows Bessel 405.		Mars following limb follows Bessel 405.		Mars following limb follows Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
10 11 20	22.72	10 19 11	22.23	10 31 30	21.21	10 39 12	20.51
12 55	.74	20 45	.18	32 43	.11	40 37	.44
14 20	.67	22 25	.09	34 50	.06	42 0	.33
15 47	.58	25 3	21.74	36 13	20.80	44 15	.29
18 0	.39	26 50	.64	37 30	.77	45 15	.18

NOVEMBER 30 and 31, 1849—Continued.

	h. m. s.	Δ α cos. δ. ′ ″	Micr. Rev.	No. of obs.
Mean	10 18 39.60	3 42.48	22.298	
Chronometer fast	13 21.00	— 0.14	Zero, 50.000	
Sid. time . . .	10 5 18.60	3 42.34	27.702	10

	h. m. s.	Δ α cos. δ. ′ ″	Micr. Rev.	No. of obs.
Mean	10 38 24.50	4 48.43	20.670	
Chronometer fast	13 21.00	— 0.15	Zero, 50.000	
Sid. time . . .	10 25 3.50	4 48.28	29.330	10

Ext. ther. 30°. Observer, G. P. B.

DECEMBER 11 and 12, 1849.

Mars following limb precedes star *a*.		Mars following limb precedes star *a*.		Mars following limb precedes star *a*.		Mars following limb precedes star *a*.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
11 42 30	26.47	11 45 33	26.17	11 48 10	25.87	11 52 22	25.62
43 48	.26	46 37	25.94	49 20	.83	53 43	.41
44 37	.22			51 16	.70	54 45	.41

	h. m. s.	Δ α cos. δ. ′ ″	Micr. Rev.	No. of obs.
Mean	11 48 26.09	3 56.18	25.900	
Chronometer fast	57.08	— 0.21	Zero, 50.000	
Sid. time	11 47 29.01	3 55.97	24.100	11

Ext. ther. 17°. Observer, G. P. B.

DECEMBER 12 and 13, 1849.

Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m s.*	*Rev.*
10 24 00	38.68	10 27 4	39.04	10 29 32	39.18	10 32 55	39.43
25 5	.67	28 20	.11	31 30	.38	33 48	.72
26 5	.91						

Remarks.

The position circle for these observations was set, by inadvertence, at 183° 53′ instead of 180° 0′. The measured distance must be diminished by 1″.80 for the true value.

Observer, G. P. B.

	h. m. s.	Δ α cos. δ. ′ ″	Micr. Rev.	No. of obs.
Mean	10 28 42.11	2 46.57	39.124	
Chronometer fast	56.40	— 0.09	Zero, 49.998	
Sid. time	10 27 45.71	2 46.48	10.874	9

Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	icrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
10 38 45	40.45	10 46 35	41.10	10 49 42	41.64	10 57 20	42.03
40 20	.39	47 45	.38	50 40	.57	58 25	.32
41 40	.69	48 38	.58	53 10	.89	59 7	.48
43 3	.80			56 5	42.14		

DECEMBER 12 and 13, 1849—Continued.

Remarks.

The star is 30′ south of Mars. Previous to this set of measures the position circle was reset.

Observer, G. P. B.

		Δ α cos. δ.	Micr.	No. of obs.
	h. m. s.	′ ″	Rev.	
Mean	10 49 22.50	1 23.62	41.465	
Chronometer fast	56.40	— 0.07	Zero, 49.998	
Sid. time	10 48 26 10	1 23.55	8.533	14

Ext. ther 18°.

DECEMBER 17 and 18, 1849.

Mars following limb follows star = 8.9 mag.		Mars following limb follows star = 8.9 mag.		Mars following limb follows star = 8.9 mag.		Mars following limb follows star = 8.9 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	Rev.	h. m. s.	Rev.	h. m. s.	Rev.	h. m. s.	Rev.
11 54 45	30.20	11 58 12	30.72	12 1 15	30.95	12 6 0	31.49
55 46	.24	58 55	.73	2 20	31.03	6 48	.43
56 52	.56	59 30	.80	3 15	.08	7 20	.43
57 30	.34	12 0 0	.89	4 30	.17	8 23	.72
				5 10	.41		

		Δ α cos. δ.	No. of obs.
	h. m. s.	′ ″	
Mean	12 1 34.76	3 .75	
Chronometer fast	55.	— 0.16	
Sid. time	12 0 39.	3 6.59	17

Ext. ther. 22°. Observer, G. P. B.

DECEMBER 18, 1849.

Mars following limb follows star = 9·10 mag.		Mars following limb follows star = 9.10 mag.		Mars following limb follows star = 9.10 mag.		Mars following limb follows star = 9.10 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	Rev.	h. m. s.	Rev.	h. m. s.	Rev.	h. m. s.	Rev.
2 18 50	71.50	2 23 0	70.83	2 27 25	70.39	2 31 18	70.98
20 15	.30	23 52	.92	28 48	.46	33 0	.87
21 15	.17			30 10	.32		

		Δ α cos. δ.	No. of obs.			Δ α cos. δ.	No. of obs.
	h. m. s.	′ ″			h. m. s.	′ ″	
Mean	2 21 26.40	3 27.09		Mean	2 30 8.20	3 21.76	
Chronometer fast	52.23	— 0.18		Chronometer fast	55.23	— 0.17	
Sid. time . . .	2 20 31.17	3 26.91	5	Sid. time . . .	2 29 12.97	3 21.59	5

Ext. ther. 22°. Observer, G. P. B.

DECEMBER 31, 1849.

Mars following limb follows Bessel 405.		Mars following limb follows Bessel 405.		Mars following limb follows Bessel 405.		Mars following limb follows Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
0 28 37	59.03	0 32 37	58.69	0 39 3	58.12	0 46 20	57.72
30 25	58.86	33 50	.62	41 17	.11	47 8	.68
31 38	.82			44 50	57.84	48 50	.59

	h. m. s.	Δ α cos. δ. ′ ″	Micr. *Rev.*	No. of obs.		*h. m. s.*	Δ α cos. δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	0 31 25.40	1 26.00	58.810		Mean	0 44 34.66	1 7.72	56.843	
Chronometer fast	59.18	— 0.07	Zero, 50.035		Chronometer fast	59.18	— 0.06	Zero, 50.035	
Sid. time . . .	0 30 26.22	1 25.93	8.775	5	Sid. time . . .	0 43 35.48	1 7.66	6.808	6

Ext. ther. 18°. Observer, G. P. B.

JANUARY 6, 1850.

Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
0 53 13.0	56.360	1 3 21.0	55.738	1 11 1.5	55.247	1 16 47.5	54.975
56 35.0	.120	4 49.5	.830	12 6	.176	18 30	.965
58 34.0	.178	5 59.0	.540	13 18	.150	22 39	.562
59 47.5	55.850	7 15.0	.430	14 23	.015	23 47	.483
1 00 42.0	.878	8 58.5	.355	15 45.5	54.902	26 18	.463

	h. m. s.	Δ α cos. δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	1 9 41.50	0 52.27	55.360	
Chronometer fast	1 1.09	— 0.05	Zero, 50.026	
Sid. time	1 8 40.41	0 52.22	5.334	20

Observer, G. P. B.

Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.		Mars following limb follows star = 13 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
1 49 22	47.080	1 52 15	47.382	1 53 54.0	47.610	1 57 52	47.773
51 9	150			56 3.5	.788		

	h. m. s.	Δ α cos. δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	1 53 25.92	0 25.11	47.464	
Chronometer fast	1 1.09	— 0.02	Zero, 50.026	
Sid. time	1 52 24.83	0 25.09	2.562	

Ext. ther. 17°.

JANUARY 10, 1850.

Mars following limb follows star = 10 mag.		Mars following limb follows star = 10 mag.		Mars following limb follows star = 10 mag.		Mars following limb follows star = 10 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
1 49 29	51.85	1 55 24	51.66	2 4 29	51.27	2 11 46	50.69
50 50	.75	56 33	.60	6 33	.17	13 16	.65
52 7	.84	57 35	.55	7 39	.04	14 40	.64
53 25	.75	0 17	.43	8 30	.06	16 5	.62
54 26	.78	2 01	.37	9 31	.00	18 37	.57
				10 55	50.73		

		Δ α cos. δ.	Micr.	No. of obs.
	h. m. s.	′ ″	*Rev.*	
Mean	2 3 31.81	0 11.83	51.239	
Chronometer fast . . .	1 0.65	— 0.01	Zero, 50.032	
Sid. time	2 2 31.16	0 11.82	1.207	21

Ext. ther. 15°.

DECLINATIONS OF MARS.

NOVEMBER 14 and 15, 1849.

Mars' S. limb, S. of Bessel 348.		Mars' S. limb, S. of Bessel 348.		Mars' N. limb, S. of Bessel 348.		Mars' N. limb, S. of Bessel 348.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
6 25 25	67.00	6 37.00	66.77	6 51 0	65.03	7 3 7	64.94
32 50	66.82	41.10	.76	55 57	64.96		

Remarks.

Images unsteady. Observer, G. P. B.

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	6 34 6.25	2 44.68	66.837	
Chronometer fast	3 10.74	— 0.05	Zero, 50.033	
Sid. time	6 30 55.51	2 44.63	16.804	4

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	6 56 41.33	2 26.45	64.977	
Chronometer fast	3 10.74	— 0.05	Zero, 50.033	
Sid. time	6 53 30.59	2 26.40	14.944	3

Ext. ther. 38°.

NOVEMBER 15 and 16, 1849.

Mars' N. limb, S. of H. C. 12554.		Mars compared with unknown star.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*
9 51 0	29.33	10 0 0	44.54
		1 55	.46
		8 20	.50

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	9 51 0.00	3 23.06	29.33	
Chronometer fast	50.65	— 0.10	Zero, 50.05	
Sid. time	9 50 9.35	3 22.56	20.72	1

Observer, G. P. B.

	h m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	10 3 41.66	0 54.39	44.50	
Chronometer fast	50.65	— 0.03	Zero, 50.05	
Sid. time	10 2 51.01	0 54.36	5.55	3

Ext. ther. 30°.

NOVEMBER 16, 1849.

Mars' N. limb, S. of H. C. 12554.		Mars' N. limb, S. of H. C. 12554.		Mars' N. limb, S. of H. C. 12554.		Mars' N. limb, S. of H. C. 12554.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
2 33 8	57.00	2 36 00	57.00	2 37 58	56.99	2 39 40	56.96

Remarks.

Disturbed atmosphere. Observer, G. P. B.

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	2 36 41.50	1 7.82	56.987	
Chronometer fast	50.66	— 0.03	Zero, 50.067	
Sid. time	2 35 50.84	1 7.79	6.920	4

NOVEMBER 16, 1849—Continued.

Mars' S. limb, S. of H. C. 12554.		Mars' S. limb, S. of H. C. 12554.		Mars' S. limb, S. of H. C. 12554.		Mars' S. limb, S. of H. C. 12554.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
2 43 1	58.40	2 49 36	58.42	2 46 58	58.31	2 48 48	58.37

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	2 47 5.75	1 21.42	58.375	
Chronometer fast . .	50.66	— 0.03	Zero, 50.067	
Sid. time	2 46 55.09	1 21.39	8.308	4

Ext. ther. 36°.

NOVEMBER 16 and 17, 1849.

Mars' N. limb, S. of H. C. 12554.		Mars' N. limb, S. of H. C. 12554.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*
10 30 10	51.98	10 36 5	51.83

Remarks.

Good seeing. Observer, G. P. B.

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	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	10 33 7.50	0 18.08	51.905	
Chronometer fast . .	50.95	— 0.01	Zero, 50.060	
Sid. time	10 32 16.55	0 18.07	1.845	2

Ext. ther. 30°.

NOVEMBER 21, 1849.

Mars' S. limb, N. of Bessel 523.		Mars' S. limb, N. of Bessel 523.		Mars' N. limb, N. of Bessel 523.		Mars' N. limb, N. of Bessel 523.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
3 8 12	68.120	3 16 5	68.405	3 24 45	70.225	3 30 5	70.350
10 10	.130	17 50	.403	27 30	.246	32 57	.249
11 18	.145	19 30	.324	28 55	.340		
12 45	.215	21 20	.373				
13 50	.277	22 50	.396				

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	3 15 23.00	2 58.71	68.279	
Chronometer fast .	53.24	— 0.06	Zero, 50.045	
Sid. time	3 14 29.76	2 58.65	18.234	10

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	3 28 50.40	3 18.32	70.282	
Chronometer fast .	53.24	— 0.06	Zero, 50.045	
Sid. time	3 27 57.16	3 18.26	20.237	5

Ext. ther. 38°.

NOVEMBER 21 and 22, 1849.

Mars' S. limb, N. of Bessel 523.		Mars' S. limb, N. of Bessel 523.		Mars' N. limb, N. of Bessel 523.		Mars' N. limb, N. of Bessel 523.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
10 7 0	74.38	10 12 25	74.32	10 17 50	76.01	10 21 30	75.99
8 25	.30	14 05	.35	19 05	.01	22 30	.98
9 35	.33	15 20	.33	20 20	.00		

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	10 11 8.23	3 58.06	74.335	
Chronometer fast	53.33	— 0.09	Zero, 50.043	
Sid. time . . .	10 10 14.90	3 57.97	24.292	6

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	10 20 15.00	4 14.38	76.001	
Chronometer fast	53.33	— 0.09	Zero, 50.043	
Sid. time . . .	10 19 21.67	4 14.29	25.957	5

Ext. ther. 36°. Observer, G. P. B.

NOVEMBER 26 and 27, 1849.

Mars' S. limb, N. of H. C. 12237.		Mars' S. limb, N. of H. C. 12237.		Mars' S. limb, N. of H. C. 12237.		Mars' S. limb, N. of H. C. 12237.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
10 54 56	48.89	10 59 30	48.84	11 1 45	48.75	11 4 15	48.71
57 30	.86						

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	10 59 35.20	0 11.95	48.810	
Chronometer fast . .	56.55	— 0.00	Zero, 50.029	
Sid. time	10 58 38.65	0 11.95	1.219	5

Ext. ther. 41°. Observer, G. P. B.

NOVEMBER 30 and 31, 1849.

Mars' S. limb, N. of Bessel 405.		Mars' N. limb, N. of Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. . s.*	*Rev.*
10 49 52	31.37	11 1 45	29.47
51 45	.29		
53 30	.38		
54 40	.37		
56 15	.27		
58	.24		

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	10 54 0.33	3 3.06	31.320	
Chronometer fast .	13 21.00	— 0.10	Zero, 50.000	
Sid. time . . .	10 40 39.33	3 2.	18.680	6

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	11 1 45.00	3 21.19	29.470	
Chronometer fast .	13 21.00	— 0.11	Zero, 50.000	
Sid. time . . .	10 48 24.00	3 21.08	20.530	1

Ext. ther. 30°. Observer, G. P. B.

DECEMBER 6 and 7, 1849.

Mars' centre, S. of star *x*.		Mars' centre, S. of star *x*.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*
11 50 0	37.68	11 53 34	37.54
51 57	.53		

DECEMBER 6 and 7, 1849—Continued.

	h. m. s.	Δ δ. ′ ″	Micr. Rev.	No. of obs.
Mean	11 51 50.33	2 1.59	37.583	
Chronometer fast . .	57.58	— 0.08	Zero, 49.990	
Sid. time	11 50 52.75	2 1.51	12.407	3

Ext. ther. 24°. Observer, W. C. B.

DECEMBER 11, 1849.

Mars' N. limb, N. of star *a*.		Mars' N. limb, N. of star *a*.		Mars' S. limb, N. of star *a*.		Mars' S. limb, N. of star *a*.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
0 48 55	57.537	0 54 5	57.500	0 59 00	55.49	1 1 53	55.53
50 35	.435	55 25	.437	1 0 20	55.51		
52 20	.438						

	h. m. s.	Δ δ. ′ ″	Micr. Rev.	No. of obs.
Mean	0 52 15.00	1 13.20	57.469	
Chronometer fast .	57.70	— 0.06	Zero, 50.000	
Sid. time	0 51 17.30	1 13.14	7.469	5

	h. m. s.	Δ δ. ′ ″	Micr. Rev.	No. of obs.
Mean	1 00 24.33	0 54.00	55.510	
Chronometer fast .	57.70	— 0.05	Zero, 50.000	
Sid. time	0 59 26.63	0 53.95	5.510	3

Ext. ther. 17°. Observer, W. C. B.

DECEMBER 12, 1849.

Mars' N. limb, N. of star = 13 mag.	
Time by chronometer.	Micrometer.
h. m. s.	*Rev.*
2 0 0	50.306

	h. m. s.	Δ δ. ′ ″	Micr. Rev.	No. of obs.
Mean	2 0 0.00	0 3.00	50.306	
Chronometer fast . .	56.83	— 0.00	Zero, 50.000	
Sid. time	1 59 3.17	0 3.00	.306	-

Ext. ther. 18°. Observer, G. P. B.

DECEMBER 17, 1849

Mars' N. limb, S. of star = 8 and 9 mag.	
Time by chronometer.	Micrometer.
h. m. s.	*Rev.*
2 2 40	43.53

	h. m. s.	Δ δ. ′ ″	Micr. Rev.	No. of obs.
Mean	2 2 40.00	1 3.41	43.530	
Chronometer fast . .	55.20	— 0.03	Zero, 50.000	
Sid. time	2 1 44.80	1 3.38	6.470	1

DECEMBER 17, 1849—Continued.

Mars' N. limb, N. of Bessel 405.		Mars' N. limb, N. of Bessel 405.		Mars' N. limb, N. of Bessel 405.		Mars' N. limb, N. of Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
2 5 25	46.48	2 8 30	46.57	2 12 40	46.43	2 17 27	46.40

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	2 11 0.00	3 34.69	46.470	
Chronometer fast . .	55.20	— 0.02	Zero, 50.000	
Sid. time	2 10 4.80	0 34.67	3.530	4

DECEMBER 18, 1849.

Mars' S. limb, S. of star = 9.10 mag.	
Time by chron'r.	Micrometer.
h. m. s.	*Rev.*
3 5 45	56.81

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	3 5 45.00	1 6.58	56.810	
Chronometer fast . . .	55.23	— 0.06	Zero, 50.016	
Sid. time	3 4 49.77	1 6.52	6.794	1

Ext. ther. 22°. Observer, G. P. B.

DECEMBER 21, 1849.

Mars' S. limb, N. of star = 9 mag.	
Time by chron'r.	Micrometer.
h. m. s.	*Rev.*
0 30 0	54.75

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	0 30 0.00	0 46.45	54.750	
Chronometer fast . . .	56.02	— 0.01	Zero, 50.010	
Sid. time	0 29 3.98	0 46.44	4.740	1

Mars' S. limb, N. of star = 9.10 mag.		Mars' S. limb, N. of star = 9.10 mag.		Mars' S. limb, N. of star = 9.10 mag.		Mars' S. limb, N. of star = 9.10 mag	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
2 33 46	55.210	2 37 17	55.280	2 38 43	55.225	2 40 29	55.215
35 37	.173						

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	2 37 10.40	0 51.07	55.221	
Chronometer fast . . .	56.02	— 0.01	Zero, 50.010	
Sid. time	2 36 14.38	0 51.06	5.211	5

Ext. ther. 48°. Observer, G. P. B.

DECEMBER 27, 1849.

Mars' N. limb, N. of Bessel 405.		Mars N. limb, N. of Bessel 405.		Mars' N. limb, N. of Bessel 405.		Mars' N. limb, N. of Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. .	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
2 37 0	51.88	2 44 50	51.85	2 48 20	51.91	2 51 37	51.93
41 5	.90						

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No of obs.
Mean	2 44 34.40	0 18.42	51.894	
Chronometer fast	58.28	— 0.01	Zero, 50.014	
Sid. time	2 43 35.12	0 18.41	1.880	5

Ext. ther. 25°. Observer, G. P. B.

DECEMBER 28, 1849.

Mars' S. limb, N. of star = 8 mag.		Mars' S. limb, N. of star = 8 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*
1 45 0	72.07	1 45 0	71.96

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	1 45 0.00	3 35 42	72.015	
Chronometer fast	58.50	— 0.14	Zero, 50.033	
Sid. time	1 44 1.50	3 35.28	21.982	2

Mars' S. limb, N. of star = 8 mag.		Mars' S. limb, N. of star = 8 mag.		Mars' N. limb, N. of star = 8 mag.		Mars' N. limb, N. of star = 8 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
3 6 55	28.28	3 9 30	28.27	3 12 11	26.76	3 15 25	26.72
8 0	.33	10 20	.32	13 25	.66	16 27	.67
8 36	.28			14 35	.75		

	h. m. s.	Δ δ. ′ ″	Mic. *Rev.*	No. of obs.
Mean	3 8 40.20	3 33.02	28.296	
Chronometer fast	58.50	— 0.14	Zero, 50.033	
Sid. time	3 7 41.70	3 32.88	21.737	5

	h. m. s.	Δ δ. ′ ″	Mic. *Rev.*	No. of obs.
Mean	3 14 24.60	3 48.55	26.712	
Chronometer fast	58.50	— 0.15	Zero, 50.033	
Sid. time	3 14 26.10	3 48.40	23.321	5

Ext. ther. 25°. Observer, G. P. B.

DECEMBER 29 and 30, 1849.

Mars' N. limb, S. of star *a*.		Mars' N. limb, S. of star *a*.		Mars' N. limb, S. of star *a*.		Mars' N. limb, S. of star *a*.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
12 15 0	26.71	12 21 51	26.28	12 17 0	31.17	12 19 0	31.24

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	12 18 12.75	3 52.06	26.350	
Chronometer fast	59.05	— 0.15	Zero, 50.030	
Sid. time	12 17 13.70	3 51.91	23.680	4

Ext. ther. 25°. Observer, W. C. B.

DECEMBER 31, 1849.

Mars' S. limb, N. of Bessel 405.		Mars' S. limb, N. of Bessel 405.		Mars' S. limb, N. of Bessel 405.		Mars' S limb, N. of Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
5 35 25	42.75	5 42 45	42.67	6 4 40	43.00	6 30 30	42.76
39 40	.90	47 23	.56	25 30	42.78	32 35	.88
41 50	.69	53 40	.65	28 0	42.89	35 15	.84

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	6 5 1.08	1 11.09	42.781	
Chronometer fast . .	59.10	— 0.06	Zero, 50.035	
Sid. time	6 4 1.98	1 11.03	7.254	12

Ext. ther. 18°. Observer, G. P. B.

JANUARY 1, 1850.

Mars' N. limb, N. of Bessel 405.		Mars' N. limb, N. of Bessel 405.		Mars' S. limb, N. of Bessel 405.		Mars' S. limb, N. of Bessel 405.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
1 43 8	53.544	1 55 3	46.530	2 5 55	53.325	2 9 10	53.325
44 45	.500	57 25	.527				
46 20	.558	59 0	.600				
47 30	.505	2 1 40	.602				
51 33	46.575						

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	1 51 49.33	0 3.67	49.660	
Chronometer fast	59.37	— 0.00	Zero, 50.034	
Sid. time . . .	1 50 49.96	0 3.67	0.374	9

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	2 7 32.50	0 32.25	53.325	
Chronometer fast	59.37	— 0.02	Zero, 50.034	
Sid. time . . .	2 6 33.13	0 32.23	3.291	2

Ext. ther. 18°. Observer, W. C. B.

JANUARY 4, 1850.

Mars' N. limb, S. of Bessel 523.		Mars' N. limb, S. of Bessel 523.		Mars' N. limb, S. of Bessel 523.		Mars' N. limb, S. of Bessel 523.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
1 44 37	45.47	1 47 10	45.35	1 49 5	45.24	1 51 5	45.30

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	1 47 59.42	0 46.08	45.340	
Chronometer fast . . .	1 0.60	— 0.03	Zero, 50.032	
Sid. time . .	1 46 58.82	0 46.05	4.692	4

Ext. ther. 25°.

JANUARY 5, 1850.

Mars' N. limb, S. of Bessel 523.		Mars' N. limb, S. of Bessel 523.		Mars' S. limb, S. of Bessel 523.		Mars' S. limb, S. of Bessel 523.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
4 29 27	60.880	4 39 26	61.050	4 47 40	62.572	4 58 25	62.776
32 49	.925	43 32.5	60.970	50 53	.613	5 2 7	.810
36 5	.850			55 3	.685		

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	4 36 15.90	1 46.89	60.935	
Chronometer fast	1 0.88	— 0.08	Zero, 50.028	
Sid. time . . .	4 35 15.02	1 46.81	10.907	5

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	4 54 48.00	1 45.10	62.691	
Chronometer fast	1 0.88	— 0.09	Zero, 50.028	
Sid. time . . .	4 53 47.12	1 45.01	12.663	5

Ext. ther. 21°. Observer, W. C. B.

JANUARY 6, 1850.

Mars' S. limb, N. of star = 13 mag.		Mars' S. limb, N. of star = 13 mag.		Mars' S. limb, N. of star = 13 mag.		Mars' S. limb, N. of star = 13 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
1 32 20	68.490	1 35 5	68.355	1 37 55	68.440	1 40 10	68.390
34 10	.455	37 0	.400	39 10	.408		

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean.	1 36 32.86	3 0.26	68.420	
Chronometer fast . . .	1 1.09	— 0.16	Zero, 50.026	
Sid. time	1 35 31.77	3 0.10	8.394	7

Ext. ther. 17°. Observer, W. C. B.

JANUARY 10, 1850.

Mars' S. limb, N. of star = 10 mag.		Mars' S. limb, N. of star = 10 mag.		Mars' S. limb, N. of star = 10 mag.		Mars' S. limb, N. of star = 10 mag.	
Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.	Time by chron'r.	Micrometer.
h. m. s.	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*	*h. m. s.*	*Rev.*
2 23 49	71.85	2 26 18	71.87	2 28 13	71.91	2 30 19	71.87
25 18	.81	27 0	.90	29 24	.87		

	h. m. s.	Δ δ. ′ ″	Micr. *Rev.*	No. of obs.
Mean	2 27 28.71	3 34.00	71.869	
Chronometer fast . .	1 0.65	— 0.20	Zero, 50.032	
Sid. time	2 26 28.06	3 33.80	21.837	7

Observer, W. C. B.

OPPOSITION OF MARS, 1849--50.

MICROMETRICAL OBSERVATIONS,

WITH

THE 8½-FEET EQUATORIAL,

AT THE

ROYAL OBSERVATORY, CAPE OF GOOD HOPE:

BY THOS. MACLEAR, Esq., F. R. A. S., &c.,

HER MAJESTY'S ASTRONOMER AT THE CAPE.

CAPE OF GOOD HOPE OBSERVATIONS.

EDITORIAL NOTICE.

OFFICE U. S. NAVAL ASTRONOMICAL EXPEDITION.

The following note appears on page 106, vol. XX, Memoirs of the Royal Astronomical Society: London, 1851.

"Mr. MACLEAR forwarded to England two copies of the observations of *Mars* made with the 8½-feet Equatorial at the Cape of Good Hope. In one all the phenomena are noted, but unreduced; in the other, the observations are fully reduced, except that the correction for parallax has not been applied to the planet. The specific object of these observations was to supply materials for determining the parallax of *Mars* in conjunction with Lieutenant GILLISS's expedition to Chile, and a copy will be forwarded to America for that purpose. It has therefore been thought unnecessary to print the details here, while the materials for deducing a place of *Mars* were considered to be too valuable to be omitted or postponed."

On application to the Secretary of the society, the observations embraced in the following pages, together with the description by Mr. Maclear of the micrometer, the equatorial adjustments, the particulars relating to the observations, the rate and error of Barraud's sidereal clock No. 1190, and the barometers, were immediately forwarded to me for publication. As many who will receive this volume may not have access to the publication above referred to, in order that the contribution of Mr. Maclear may be as complete as possible, it is deemed proper to reprint here his account of the instrument.

MR. MACLEAR'S DESCRIPTION OF THE EQUATORIAL INSTRUMENT.

[From vol. XX, *Memoirs of the Royal Astronomical Society:* London, 1851.]

"The instrument is the work of MERZ & SON, of Munich. It differs little, except in dimensions, from those made by the same artists for the observatories of Pulkova and Washington, and is nearly identical with that which belongs to the Rev. W. R. DAWES. The telescope tube is of wood, veneered with mahogany. It is very firm, as will be shown presently. The object-glass is nearly seven inches in diameter, and about 8½ feet focal length. It is provided with two micrometers and eleven eye-pieces. The powers of the eye-pieces belonging to the position micrometer are 123, 161, 273, 347, and 464, calculating them from the diameters of the images, on the supposition that the clear aperture of the object-glass is 6.9 inches. The power of the double annular micrometer is 64, and of the five Huyghenian eye-pieces, 86, 128, 200, 302, and 458. There is a prismatic piece for viewing objects near the zenith, on which the eye-pieces fit.

"The divided circle of the position micrometer is four inches in diameter. Each degree is divided into four parts, and, by means of two opposite verniers, to single minutes. The divisions are on the plane of the circle. The counting scale of the micrometer screw is outside, an essential arrangement for 'dark field' measurements. One revolution of the micrometer screw carries the wire over $26''.0697$, and its total range is 60 revolutions. There is a reflector in the tube for the ordinary method of 'down-tube' illumination, and a double lamp apparatus near the eye-piece for 'dark field' illumination. The latter is almost exclusively employed.

"Like the position-micrometer on the English construction, this has two parallel movable wires; but one of the screws only is provided with a register-head. The other is simply a zero wire, and is subservient to either the cross measure or to measurement by repetition. Both constructions have a dovetail slide for the eye-lenses, worked by a rack and pinion; but independent of this the Munich register-slide carries the eye-lenses with it, by which the wire is kept in the centre of their field; this is a decided advantage.

"When the telescope is pointed towards the zenith, it is much more convenient for the observer to have the divisions of the position-circle on the edge (mural-circle fashion) than on the face, as in the Munich construction.

"The declination-circle is about 12½ inches in diameter, and is read by means of two opposite verniers to 10″; but less than half this quantity can be estimated. The degrees are numbered from 0° to 360°, and when the telescope is west of the pier, and pointed to the equator, the vernier reads 0°.

"The right ascension, or hour-circle, is about 9.6 inches in diameter. The hours are numbered from 0*h.* to 24*h.*, and the subdivisions are read by means of two opposite verniers to 4*s.*; but single seconds can be estimated with facility. 0*h.* is parallel to the telescope end of the declination axis; and telescope east of the pier, the readings increase with the diurnal motion of the heavens.

"The driving clock performs its duty remarkably well, and without noise or tremor. The head must be placed in contact with the box to hear it. Its construction is similar to that attached to the great refractor at Pulkova.

"Few direct experiments have been made to determine the quality of the object-glass; but these have proved satisfactory. The two last stars in the trapezium of Orion are instantly visible, even in bright moonlight.

"The companion to α *Orionis* is seen under favorable circumstances. Bright stars are round during good atmospheric conditions, and under high powers are surrounded by well-defined rings. The companion to *Antares* is well separated from its primary under favorable circumstances, and the measures appear to be little inferior in precision to those of α *Centauri*. There is a slight tint of blue towards the margin of the field when a bright star is in the centre. The binary γ *Coronæ Australis* presents two bright dots, separated by a black line. Their distance is less than 2″.

"The telescope tube was proved to be stiff when it became necessary to employ this instrument for obtaining an approximate determination of the declinations of faint stars compared with *Metis*, the mural circle being (optically) unequal to the task with the ordinary method of 'down-tube' illumination. To test the flexure of the equatorial telescope tube, twenty stars were selected from the *Nautical Almanac* between right ascension 0*h.* and 7*h.*, and in declination from α *Persei* to α *Trianguli Australis* S. P. The observations were made near the meridian, and each star was observed in reversed positions of the telescope. At the time, the adjustments were as follows: The micrometer rotated on a *point* in the wire when the screw-head registered 30.14 rev. The collimation error in right ascension was 3″; the inclination error of the declination to the polar axis 16″.4. The co-ordinate deviations of the instrumental south polar pivot from the celestial pole were $x = 10''.1$ towards the zenith, $y = 0''.8$ towards the west.

"Assuming the tabular declinations to be correct, the result for the constant of flexure was 0″.4. That the quantity was so small is, no doubt, partly accidental, because the probable error was greater, and because the circle readings cannot well be estimated below 3″, although the divisions are remarkably clear and distinct.

"The application of an instrument of this construction to the purpose above mentioned, is justified by necessity alone. But it is proper to explain that zero stars were substituted for levels, &c. Then, making due allowance for the disproportion between the optical power of the telescope and the dimensions of the declination-circle, if the relation between the optical axis of the one and the verniers of the other remain constant for a few hours, with a firm pier and stiff

telescope, the mean of several nights' observations, under similar circumstances, will not be wide of the truth.

"The only inconvenience of the Munich mounting, as respects this instrument and form of pillar, is when stars near β *Hydri* are observed, telescope west. The projection of the parts about the driving clock stops the telescope *in the meridian.* Elsewhere, objects can be followed 15 or 20 minutes across the meridian without reversion, uninterrupted by the pier.

"When describing the dome I omitted to mention, that by means of a system of pins and projecting cogs from the upper curb, the dome is moved with great facility, either by a lever or pulley. A cord and pulley are made use of in the continued observation of the same object.

"The situation of the building is 53 yards distant from the nearest corner of the west wing of the observatory. The instrument commands the sweep of the horizon, excepting the angle cut off by the observatory to the southeast, viz: between 320° and 350° in azimuth, reckoned from the south point round by the west.

"In conclusion, it may not be out of place to mention that almost the first pointing of the telescope proved the rapid motion of the binary γ *Coronæ Australis,* in position and distance, predicted by Sir John Herschel from very scanty data."

The proof-sheets of Mr. Maclear's observations have been read by myself with his original MS., and every attention given to insure accuracy.

J. M. G.

Washington, 1855.

OPPOSITION OF MARS:

1849–50.

OBSERVATIONS MADE AT THE ROYAL OBSERVATORY, CAPE OF GOOD HOPE.

$8\frac{1}{2}$-FEET EQUATORIAL MICROMETER.

This micrometer is provided with two parallel spider lines, 0″.94 of a great circle in thickness. One of these is called the zero wire, and is moved by a screw without a register-head. The other, or micrometer wire, is moved by a screw whose head is divided into 100 parts, and the range is 60 revolutions. The revolution scale is placed conveniently outside; and by the motion of the micrometer screw the eye-piece is carried along, so that the wire is kept in the centre of the eye-piece field. The rack-edge which moves the eye-piece slide is limited to the range of 30 revolutions of the micrometer screw; so that, when the zero wire is near one edge of the field, (with the lowest power 123,) the micrometer wire is at the other edge.

When making observations for discovering the run of the screw, the wires were placed 20 revolutions apart.

By 40 transits of equatorial stars observed near the meridian over the centre, 20 revolutions, corrected for refraction in right ascension, 1 revolution . . . . = 26″.0699

By 30 transits over the same interval . . . . = 26″.0698

By 20 transits, from revolution 10 to revolution 30, and from 30 to 50 . . . = 26″.06715

The mean is 26″.06925 or 26′ 4″.155 for the 60 revolutions. Mean of the temperatures during observation about 66°.

These observations were made on three different nights.

The readings of the screw-head and revolution scale *increase* on turning the screw backwards, which order carries the wire in the direction of the screw-head.

EQUATORIAL ADJUSTMENTS.

Before the commencement of the observations on Mars, a point in the wire was stationary during a revolution of the position verniers, when the reading of the screw-head was 30.14 rev.

The collimation error in right ascension was 0.3*s*.

The inclination of the declination to the polar axis, 16″.4.

The excentric co-ordinates of the south polar pivot, $x = 10''.1$ towards the zenith, $y = 0''.9$ towards the west.

Declination circle reading for the polar point, 270° 0′ 23″.5.

At the termination of the observations, the position circle verniers rotated round a point in the wire, when the screw-head reading was 30.15 rev.

The collimation error in right ascension, 1.07*s*.

The inclination of the declination to the polar axis, 8″.8.

The excentric co-ordinates of the south polar pivot, $x = 11''.7$ towards the zenith, $y = 2''.3$ towards the west.

Declination circle reading for the instrument at polar point, 270° 0′ 17″.2.

The hour circle verniers, on November 1, were supposed to read 0*h.* or 12*h.* exactly, when the telescope was in the meridian east or west of the pier. However, on the 29th of December, they appeared to show the hour angles 7*s.* too small; or telescope west, 6*s.*, excluding the collimation error. It is not likely that the cradle bearing would change its position, or the pier sink towards the west. Both verniers gave the same reading. There is no right ascension wire other than the parallel wires placed perpendicular to the meridian by turning the position verniers through 90°. But this is of little consequence; for all practical astronomers know that the bisection of an object at a given instant is merely a matter of chance. For this reason the hour circle readings were held to represent the hour angles. The object was bisected or touched on entering the field, and continued to be corrected as to bisection or contact until it reached the centre of the field. The clock times noted in general for Mars are considered in no other light than checks on the hour angles; but they will serve also for investigating if any change took place in the position of the verniers, or whether it was constant from the 21st of November to the 17th of January, bearing in mind that they are liable to a fluctuation of 2*s.* or 3*s.* with respect to the meridian passing through the centre of the field.

PARTICULARS RELATING TO THE OBSERVATIONS.

The telescope was usually on the west side of the pier, and the polar axis always clamped during each comparison. On 35 of the nights, the comparisons were made as follows:

The declination axis being clamped at a convenient reading, viz: at the reading which corresponded with the middle in declination between the objects, on the preceding object entering the field it was observed with the micrometer wire. If there was a sufficient interval in right ascension, the hour circle was next read. The micrometer wire was then slowly driven to the parallel of the following object, which, on entering the field, was observed with the micrometer wire. If the hour circle had not been read between the observations, it was now read off. The polar axis was then unclamped, and the telescope moved in advance for another comparison; and so on.

On December 7, 8, 16 (2d series,) 17, 18, 20, 21, 22, the declination axis was not clamped. On the preceding object entering the field, the zero wire (usually at or near the 30th revolution) was made to bisect or to touch the object by gently tapping the telescope, (the declination tangent screw is not sufficiently delicate for this purpose,) and the micrometer wire was placed on the following object. The reading of the hour circle was made according to the circumstances before stated. When one-half of the comparisons contemplated were thus made, the position circle verniers were turned 180°, and the micrometer wire brought to the opposite side of the zero wire, in which position the remaining half of the comparisons were made as before. Reversing between each comparison would have absorbed too much time; the verniers are inconveniently placed, and the divisions minute. By this proceeding, the coincidence of the wires' reading is not necessary when the observations in reversed positions are combined. Much delicacy is required in moving the micrometer when the declination circle is not clamped, and, indeed, when it is clamped; for there is considerable play. On December 6, the verniers were not reversed. For that occasion the coincidence of the wires is given.

On December 24, * H. C. 10669 could not be observed until it escaped from the limb. It was then compared with the planet's centre, using the driving clock as in measuring a double star. I suspect the declination of H. C. 11946 (comparison star Nov. 25, 26) is erroneous. The two stars nearest to the ephemeris position were observed with the planet. But Mr. Childe has observed a star which agrees in right ascension with the ephemeris. This led me to examine with the equatorial on Monday night, when I was again unsuccessful. Last night

was overcast. Mr. Childe has been directed to observe the star again with the transit instrument, which will clear up the discrepancy. There are several stars in the locality.

NOTE.—When the telescope is west of the pier, and in the meridian, vernier 1 of the hour circle should read 0*h.* 0*m.* 0*s.* On turning the telescope westward, the readings increase. The circle is numbered from 0*h.* to 24*h.*

BAROMETERS.

(1.) The barometer employed in the equatorial room is by Newman, and nearly new. It is of the "mountain" construction, and is in excellent order. The frame or case is composed of bronzed brass, quadrilateral shaped above the cistern. The vernier and scale are of silvered brass: the former is screwed to the frame; the latter is worked by a rack and pinion. The diameter of the tube is not given, but it appears to be two-tenths of an inch. The ratio of its area ($\frac{1}{49}$) to the area of the cistern is marked on the case.

(2.) The standard barometer in the circle room, by Jones, No. 580, is the same which Mr. Henderson has described in the Memoirs of the Astronomical Society. Its frame is of brass, and its cistern is adjustable. This barometer is always employed with the mural circle room observations.

(3.) Newman's was hung upon the mural circle pier on two occasions for several days, and compared with Jones's while the height of the column ranged between 29.724 and 30.128 inches; the mean of the temperatures common to both being about 69°, (lowest 67°.2; highest 70°.8.) Jones's cistern was carefully adjusted for each comparison. Newman's is not adjustable.

Thirty-two comparisons gave as follows:

From 29.724 inches	to 29.8	inches,	8	comparisons,	mean	= — 0.0102	inch.
29.8	"	to 29.9	"	5	"	"	= — 0.0088	"
29.9	"	to 30.0	"	7	"	"	= — 0.0100	"
30.0	"	to 30.128	"	12	"	"	= — 0.0123	"

The mean of the sum of these means is . . . . . 0.0103 inch.
The arithmetical mean of the whole is . . . . . 0.0106 "

by which the indications of Newman's are *lower* than the standard by Jones. Now the variation or capacity correction for 0.402 inch should be $402 \times \frac{1}{49} = 0.008$, whereas by experiment it is only 0.002. It is singular that the neutral point is not marked upon Newman's. The lower end of the scale is hid, but I am not aware of any contrivance by which it could operate on the height of the mercury in the cistern. Perhaps the safest course is to adopt 0.010 inch for the common difference, particularly for the present observations on Mars.

(4.) The correction for capillarity (.029) is common to both.

(5.) For connecting Newman and the Cape standard (Jones's) with the standard of the Royal Observatory, Greenwich, the Royal Society's *Daniel* may be referred to; but this requires an investigation which will be apparent from what follows.

(6.) Mr. Henderson states, (*R. Ast. Soc. Mem.*, vol. x, p. 51:) "For the purpose of obtaining comparisons of the observatory barometer with the Royal Society's standard, Sir John Herschel had the kindness to lend an excellent mountain barometer, made by Troughton. This was compared with the Royal Society's standard by Mr. Hudson; first in January, 1832, before I went to the Cape, when it was found that both barometers being at the same temperature, and the Royal Society's being corrected for the difference of capacities of the tube and cistern, and for capillarity, Sir John Herschel's barometer was 0.048 inch lower than the Royal Society's; and again in October, 1833, after my return, when it was found in like manner that Sir John Herschel's barometer was 0.050 inch lower than the Royal Society's. From all the comparisons made at the Cape it appeared that Sir John Herschel's barometer was ...... 0.057 inch lower than Jones's. Hence, it is inferred that ...... Jones's is 0.008 inch higher than the Royal Society's standard. These differences have been applied to the readings of the barom-

eters in computing the refractions, so that the refractions correspond to altitudes of the mercurial column, indicated by the standard barometer of the Royal Society."

(7.) There is nothing in this account to indicate that the capillarity correction was applied to the Cape standard by Jones. Mr. Henderson's astronomical observations are in England; and the numbers may be found therein which would settle the question. In the hope of obtaining information by another channel here, I compared Jones's with the Magnetic Observatory standard by Newman. The comparison agrees with Capt. Wilmot's in showing that Jones's is *lower* than the Magnetic Observatory barometer by 0.013 inch—no correction for capillarity being applied to either. But the Magnetic Observatory barometer is not the one referred to in the report of the meteorological committee of the Royal Society. That barometer was broken in its passage to the Cape. The present one was sent out in 1840 or 1841. I have no document or register of its comparison at Somerset House. I believe it was compared there, and no doubt the register can be got at. The diameter of the Magnetic Observatory barometer's tube is 0.508 inch; consequently the capillarity correction is 0.003. Omitting this correction to either of the Cape barometers, the Magnetic Observatory's barometer is higher than the Royal Society's Daniel by $0.008 + 0.013 = 0.021$ inch; the capillarity correction being applied to Daniel, but not to either of the others.

(8.) Mr. Bailey has shown, (Philosophical Transactions, 1837, part 2, page 436 *et seq.*) that Daniel's Royal Society's standard, between the years 1827 and 1837, had been corrected for temperature on the hypothesis that the distance between the surfaces of the mercury in the tube and cistern was measured on glass; whereas the case is wood, and the scale is on a slip of brass attached to the wood—the numbers for expansion being .0000857339. These limits include Henderson's comparisons. Sir John Herschel's being of brass (6), would be at all times comparable with Jones's. The latter, therefore, should be further corrected for (*expansion of glass—the expansion of brass*) × into the difference in temperature between the comparisons at Somerset House and the Cape. The tendency of this correction, assuming the temperature at Somerset House to be the lowest, is to shorten the scale of Daniel, which increases the reading for the height of the column and diminishes the difference between it and Jones's, or to destroy 0.008 altogether.

(9.) If Henderson entered the original readings in his journal both at Somerset House and the Cape, the examination of these numbers will clear up whether the capillarity correction was applied to Jones or not. They will also furnish the elements for the correction pointed out by Bailey for Daniel.

The comparison of the Magnetic Observatory standard with (?) the crown and flint glass barometers at Somerset House, (Philosophical Transactions, 1837,) will (?) furnish a second determination.

(10.) The journals at the Cape Magnetic Observatory are silent with regard to any barometric index error; none appears to have been applied in any of the returns to Woolwich. The mercurial column is, and has been, corrected for the expansion of the mercury and brass alone.

(11.) The original barometric readings from Newman are given with the equatorial observations on Mars, and the original readings from Jones are given with the circle observations without any correction whatever to either. Paragraph (3) furnishes their common difference.

THOS. MACLEAR.

RATE AND ERROR OF BARRAUD'S SIDEREAL CLOCK, NO. 1190.

November 18, 1849.—The clock is placed within a niche in the wall. The case rests on a block of masonry connected with the wall as loosely as practicable. The back of the case, at about half its height, is screwed to a wall-binder. The niche is lined with painted tin to preserve the case from saline moisture. The barometer and a detached thermometer are suspended close to the clock. Pendulum adjusted yesterday. 20 grains removed from cistern this morning. Now there is not any adjusting weight upon the cistern.

Date.	Clock error at 0h. Cape sid. time.	Rate.	Thermometer.	Barometer.	Remarks.
1849.	s.	s.	°	Inch.	
November 18	+8.70				Rainy weather lately. Cumuli.
		+0.087			
21	8.96	. .	61 to 57	30.02 to 30.10	Rain.
		—0.030			
22	8.93	. .	58 to 74	30.08 to 29.89	Overcast; cirri.
		0.030			
23	8.90	. .	60 to 81	29.85 to 29.86	Cirro strati.
		0.120			
24	8.78	. .	53 to 70	29.89 to 30.17	Thickly overcast.
		0.210			
25	8.57	. .	53 to 73	30.16 to 30.10	Cirri.
		0.180			
26	8.39	. .	60 to 75	30.09 to 30.09	Calm.
		0.095			
28	8.20	. .	53 to 76	29.96 to 30.10	Sometimes overcast.
		0.180			
30	7.84	. .	54 to 74	30.05 to 30.13	Gloomy day.
		0.350			
December 1	7.49	. .	51 to 74	30.09 to 30.15	Hazy; cirri.
		0.453			
4	6.13	. .	56 to 71	30.02 to 29.98	Black souther; strong wind.
		0.480			
5	5.65	. .	58 to 80	29.98 to 29.86	Hazy horizon.
		0.277			
8	4.82	. .	59 to 79	29.98 to 30.08	Black southeaster; strong wind.
		0.277			
11	3.99	. .	51 to 78	30.03 to 29.73	Occasional showers.
		+0.043			
15	4.16	. .	59 to 75	30.10 to 30.19	Clear weather; occasional wind.
		—0.083			
18	3.91	. .	59 to 76	30.02 to 30.10	Black southwester on the 17th.
		0.063			
21	3.72	. .	54 to 69	30.10 to 30.22	Clear weather.
		+0.001			
22	3.73	. .	54 to 74	29.97 to 30.10	Generally clear and nearly calm.
		—0.061			
29	3.30	. .	52 to 75	29.80 to 30.16	Generally cloudy weather for several days.
1850.		0.053			
January 7	2.88	. .	50 to 80	29.73 to 30.08	Rain on the 1st; storm on the 5th.
		+0.057			
10	3.05	. .	54 to 78	29.82 to 30.08	Black southeaster yesterday.
		—0.145			
12	2.76	. .	57 to 85	29.76 to 30.07	Occasional haze.
		—0.410			
17	+0.71	. .	57 to 78	29.96 to 30.02	Generally clear weather since the 12th.

OPPOSITION OF MARS.

MICROMETRICAL MEASUREMENTS AT THE ROYAL OBSERVATORY, CAPE OF GOOD HOPE.

NOVEMBER 21, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . 2058 .	30.130	13 5.47	22 45 11					Power 161. Telescope east of pier.
Mars . . . S.L. .	52.822	22 57.03	. . .	5 7 5	30.078	58.2	59.6	Hour circle verniers accurately adjusted, the readings give the apparent hour angle. Both circles clamped for each set. Micrometers *only* were used.
ε Geminor.	51.322	22 17.93	. . .					Endeavored to allow for half thickness of wire when placed on the planet's limb.
B. A. C. . . 2058 .	30.447	13 13.73	23 12 56					Good definition; atmosphere rather moist.
Mars . . . N.L. .	53.762	22 21.54	. . .	5 34 44	30.085	58.2	59.4	
ε Geminor.	51.480	22 22.04	. . .					
B. A. C. . . 2058 .	30.484	13 14.70	23 39 27					
Mars . . . S.L. .	53.340	23 10.53	. . .	6 1 20	30.080	58.2	59.4	
ε Geminor.	51.496	22 22.46	. . .					
B. A. C. . . 2058 .	30.473	13 14.41	0 6 40					
Mars . . . N.L. .	54.094	23 30.19	. . .	6 28 30	30.085	58.2	59.4	
ε Geminor.	51.502	22 22.62	. . .					

One revolution of micrometer = 26″.06925.

NOVEMBER 22, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N.L. .	30.610	13 17.98	0 26 36	6 47 27	29.942	63.8	64.0	Power 161. Telescope east.
ε Geminor.	20.033	8 42.25	. . .					Both axes clamped for each set.
Mars . . . S.L. .	30.076	13 4.06	0 43 16	7 4 9				Zero wire not used.
ε Geminor.	20.010	8 41.64	. . .					Endeavored to split the wire on the limb.
Mars . . . N.L. .	30.716	13 20.74	1 0 16	7 21 10				Cloudy haze; B. A. C. 2058 invisible.
ε Geminor.	19.948	8 40.03	. . .					
Mars . . . S.L. .	30.108	13 4.89	1 18 50	7 39 44	29.922	63.8	64.0	
ε Geminor.	19.811	8 36.46	. . .					

One revolution of micrometer = 26″.06925.

NOVEMBER 24, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . . 11854 .	30.251	13 8.62	23 39 52					Power 161. Telescope east.
Mars . . . S.L. .	42.069	18 16.71	. . .					
H. C. . . . 11854 .	30.298	13 9.85	23 59 0					Power 161.
Mars . . . N.L. .	42.853	18 37.17	. . .					
H. C. . . . 11854 .	30.148	13 5.94	0 26 0					Power 273.
Mars . . . S.L. .	42.210	18 20.38	. . .					
H. C. . . . 11854 .	30.100	13 4.68	0 48 0					Power 273.
Mars . . . N.L. .	42.970	18 40.20	. . .					

One revolution of micrometer = 26″.06925.

NOVEMBER 25, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . . 11946 .	23.902	10 23.11	23 23 0	. . .	30.096	59.5	61.4	Power 273. Telscope east.
* Anon	30.080	13 22.93	. . .					Wire placed *within* limb of planet, viz: the outer edge of wire tangent to limb; hence half thickness of wire to be added, when the semi-diameter is in question.
Mars . . . N.L. .	21.211	9 12.95	. . .					
H. C. . . . 11946 .	23.892	10 22.85	23 39 0					
* Anon	30.030	13 9.90	. . .					
Mars . . . S.L. .	20.616	8 57.44	. . .	5 57 8				
H. C. . . . 11946 .	23.832	10 21.28	23 53 28					
* Anon	30.010	13 4.68	. . .					
Mars . . . N.L. .	21.279	9 14.73	. . .	6 11 34				
H. C. . . . 11946 .	23.806	10 20.60	0 7 3					
* Anon	29.995	13 0.77	. . .					
Mars . . . S.L. .	20.759	9 1.17	. . .	6 25 8				
H. C. . . . 11946 .	23.781	10 19.95	0 22 28					
* Anon	29.925	13 0.12	. . .					
Mars . . . N.L. .	21.393	9 17.70	. . .	6 40 28				
H. C. . . . 11946 .	23.682	10 17.37	0 38 43					
* Anon	29.829	12 57.62	. . .					
Mars . . . S.L. .	20.862	9 3.86	. . .	6 56 44	30.079	59.0	60.3	

Neither of the stars correspond to the Ephemeris position, nor is there any star in that position. The first of the two stars compared with the planet in each set is the nearest to the point; it is about 9½ magnitude.

	h. m. s.		° ′ ″
The A. R. approximate are—	6 7 59	Approximate declination—	+ 25 32 13
	6 9 51		+ 25 34.04

These numbers are only approximate, and are derived from the Equatorial circles.

One revolution of micrometer = 26″.06925.

NOVEMBER 26, 1849.								
Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . . 11946 .	29.850	12 58.17	12 3 0	. . .	30.097	65.8	66.0	Power 161; telescope west.
*	. .	. . .	. . .					* is the same which was observed yesterday.
Mars . . . N.L. .	24.330	10 34.26	. . .					Fair definition.
H. C. . . . 11946 .	29.882	12 59.00	12 17 0					Wire *within* limb.
*	23.682	10 17.37	. . .					
Mars . . . S.L. .	24.970	10 50.95	. . .	6 33 52				
H. C. . . . 11946 .	29.849	12 58.14	12 29 54					
Mars . . . N L. .	24.360	10 35.05	. . .	6 46 49				
H. C. . . . 11946 .	29.998	13 2.03	12 43 30	. . .	30.088	65.1	64.6	
Mars . . . S.L. .	24.925	10 49.78	. . .	7 0 28				
H. C. . . . 11946 .	30.037	13 3.04	12 58 9					
*	23.912	10 23.37	. . .					
Mars . . . N.L. .	24.367	10 35.20	. . .	7 15 6				
H. C. . . . 11946 .	30.083	13 4.24	13 9 48	. . .	30.077	64.8	64.2	
*	23.948	10 24.31	. . .					
Mars . . . S.L. .	25.029	10 52.49	. . .	7 26 41				

One revolution of micrometer = 26″.06925.

NOVEMBER 27, 1849.								
Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N.L. .	40.100	17 25.38	11 2 40	5 19 30	29.990	61.9	61.5	Power 161.
H. C. . . . 12336 .	29.610	12 51.91	. . .					Wire *within* limb.
Mars . . . S.L. .	40.730	17 41.80	11 10 33	5 26 22				Telescope west.
H. C. . . . 12336 .	29.499	12 48.90	. . .					Screw-head below.
Mars . . . N.L. .	39.987	17 11.43	11 17 24	5 33 15				Planet south of star.
H. C. . . . 12336 .	29.489	12 38.75	. . .					Very strong S.E. wind. Nebulous definition.
Mars . . . S.L. .	40.579	17 37.85	11 24 37	5 40 25				
H. C. . . . 12336 .	29.537	12 50.01	. . .					
Mars . . . N.L. .	39.869	17 19.35	11 34 28	5 50 18				
H. C. . . . 12336 .	29.478	12 48.47	. . .					
Mars . . . S.L. .	40 524	17 36.43	11 40 49	5 56 38				
H. C. . . . 12336 .	29.501	12 49.07	. . .					
Mars . . . N.L. .	39.855	17 18.99	11 46 24	6 2 12				
H. C. . . . 12336 .	29.521	12 49.59	. . .					
Mars . . . S.L. .	40.471	17 35.05	11 52 16	6 8 3				
H. C. . . . 12336 .	29.530	12 49.82	. . .					
Mars . . . N.L. .	39.832	17 18.39	11 58 40	6 15 27				
H. C. . . . 12336 .	29.484	12 48.62	. . .					
Mars . . . S.L. .	40.472	17 35.07	12 4 24	6 20 10				
H. C. . . . 12336 .	29.550	12 50.34	. . .					
Mars . . . N.L. .	39.850	17 18.86	12 10 43	6 26 30	29.950	61.7	61.5	
H. C. . . . 12336 .	29.594	12 51.49	. . .					

NOVEMBER 27, 1849—Continued.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . S.L. .	40.442	17 34.29	12 19 48	6 35 36	29.950	61.7	61.5	
H. C. . . . 12336 .	29.615	12 52.04	. . .					
Mars . . . N.L. .	39.715	17 15.34	12 25 38	6 41 20				
H. C. . . . 12336 .	29.568	12 50.82	. . .					
Mars . . . S.L. .	40.424	17 33.82	12 32 24	6 48 15	29.950	62.0	61.5	
H. C. . . . 12336 .	29.630	12 52.41	. . .					

One revolution of micrometer = 26″.06925.

NOVEMBER 28, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N.L. .	32.312	14 2.35	11 9 34	5 26 13	29.968	64.8	64.2	Power 161.
H. C. . . . 12336 .	29.522	12 49.62	. . .					Wire *within* limb.
Mars . . . S.L. .	32.949	14 18.96	11 17 6	5 30 40				Screw-head below.
H. C. . . . 12336 .	29.578	12 51.08	. . .					Telescope west.
Mars . . . N.L. .	32.282	14 1.57	11 24 0	5 39 33				Planet south of star.
H. C. . . . 12336 .	29.502	12 49.10	. . .					Nebulous definition.
Mars . . . S.L. .	32.864	14 16.74	11 30 16	5 44 50				
H. C. . . . 12336 .	29.554	12 50.45	. . .					
Mars . . . N.L. .	32.260	14 0.99	11 38 24	5 52 58	29.954	64.0	63.2	
H. C. . . . 12336 .	29.570	12 50.87	. . .					
Mars . . . S.L. .	32.798	14 15.04	11 44 48	5 59 25				
H. C. . . . 12336 .	29.532	12 49.88	. . .					
Mars . . . N.L. .	32.177	13 58.83	11 51 16	6 5 51				
H. C. . . . 12336 .	29.532	12 49.88	. . .					
Mars . . . S.L. .	32.740	14 13.51	11 57 36	6 12 12				
H. C. . . . 12336 .	29.510	12 49.30	. . .					
Mars . . . S.L. .	32.692	14 12.26	12 4 0	6 18 35				
H. C. . . . 12336 .	29.576	12 51.02	. . .					
Mars . . . N.L. .	32.063	13 55.86	12 11 46	6 26 18				
H. C. . . . 12336 .	29.520	12 49.56	. . .					
Mars . . . N.L. .	32.053	13 55.60	12 18 51	6 33 25	29.954	63.5	62.8	
H. C. . . 12336 .	29.590	12 51.39	. . .					
Mars . . . S.L. .	32.688	14 12.15	12 25 47	6 40 22	29.952	63.0	62.8	
H. C. . . . 12536 .	29.610	12 51.91	. . .					

One revolution of micrometer = 26″.06925.

NOVEMBER 29, 1849.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . .	N.L. .	30.246	13 8.49	12 20.50	6 34 10	29.986	66.8	66.0	Power 161.
H. C. . . .	12336 .	35.460	15 24.41	. . .					Wire *within* limb.
Mars . . .	S.L. .	30.820	13 23.45	12 29 50	6 43 11				Screw-head below.
H. C. . . .	12336 .	35.410	15 23.11	. . .					Telescope west.
Mars . . .	N.L. .	30.197	13 7.21	12 38 7	6 51 25				Planet north of star.
H. C. . . .	12336 .	35.491	15 25.22	. . .					Black southeastern cloud; tail of it spreads over.
Mars . . .	S.L. .	30.838	13 23.92	12 46 8	6 59 30				Nebulous definition.
H. C. . . .	12336 .	35.576	15 26.01	. . .					
Mars . . .	N.L. .	30.170	13 46.39	12 55 19	7 8 36				
H. C. . . .	12336 .	35.493	15 25.26	. . .					
Mars . . .	S.L. .	30.786	13 22.57	13 3 50	7 17 6				
H. C. . . .	12336 .	35.610	15 28.32	. . .	. . .	29.982	66.4	65.6	

One revolution of micrometer = 26″.06925.

NOVEMBER 30, 1849.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . .	N.L. .	17.334	7 31.88	11 1 16	5 13 16	30.094	64.8	64.5	Power 161.
H.C. . . .	12336 .	29.608	12 51.86	. . .					Wire *within* limb.
Mars . . .	S.L. .	17.860	7 45.60	11 11 40	5 24 40				Micrometer head below.
H.C. . . .	12336 .	29.568	12 50.82	. . .					Planet north of star.
Mars . . .	N.L. .	17.226	7 29.07	11 21 21	5 33 25	30.094	64.5	64.0	Telescope west.
H.C. . . .	12336 .	29.645	12 52.82	. . .					Observations interrupted by striæ.
Mars . . .	S.L. .	17.815	7 44.42	11 31 0	5 42 58	30.094	64.4	63.9	Calm.
H. C. . . .	12336 .	29.638	12 52.64						

One revolution of micrometer = 26″.06925.

DECEMBER 1, 1849.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . .	N.L.	20.095	8 23.86	11 24 6	5 34 45	30.105	63.2	62.5	Power, 161.
H. C. . . .	12395	30.354	13 11.31	. . .					Wire *within* limb.
Mars . . .	S.L.	20.712	8 59.97	11 37 32	5 48 12				Telescope west.
H. C. . . .	12395	30.400	13 12.51	. . .					Micrometer head below.
Mars . . .	N.L.	20.061	8 42.97	11 53 30	6 4 8	30.103	62.4	61.5	Planet north of star.
H. C. . . .	12395	30.441	13 13.58	. . .					Fair definition.
Mars . . .	S.L.	20.729	9 0.39	12 6 48	6 17 26				Calm.
H. C. . . .	12395	30.558	13 16.62	. . .					

DECEMBER 1, 1849—Continued.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . .	N.L.	20.060	8 57.03	12 20 0	6 30 36	30.091	61.8	61.0	
H. C. . . .	12395	30.600	13 17.72	. . .					

One revolution of micrometer = 26″.06925.

The following measures were made with the declination circle, in order to ascertain its probable power.

	Declination circle.	Clock.
	° ′ ″	h. m. s.
Mars N. L.	25 49 39	7 3 0
H. C. 2058	25 5 45	7 10 15
Mars S. L.	25 49 25	7 13 35
H. C. 2058	25 5 41	7 17 21

DECEMBER 2, 1849.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . .	N.L.	13.034	5 39.79	12 50 38	6 59 50	30.018	65.5	65.0	Power 161.
H. C. . . .	12395	30.830	13 23.71	. . .					Wire *within* limb.
Mars . . .	S.L.	13.601	5 54.57	13 7 58	7 17 6	30.012	65.0	64.8	Telescope west.
H. C. . . .	12395	31.017	13 28.59	. . .					Micrometer head below.
Mars . . .	N.L.	13.070	5 40.72	13 24 18	7 33 27	30.012	65.0	64.8	Planet north of star.
H. C. . . .	15395	31.198	13 33.31	. . .					Southeast wind and indifferent definition.
Mars . . .	S.L.	13.780	5 59.22	13 41 0	7 50 12	30.011	65.0	64.7	
H. C. . . .	12395	31.302	13 36.02	. . .					

One revolution of micrometer = 26″.06925.

DECEMBER 3, 1849.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . .	11684 .	31.012	13 28.46	11 20 23					Power 161.
Mars . . .	N.L. .	42.464	18 27.00	. . .	5 28 (?)	29.956	67.5	67.2	Wire *within* limb.
H. C. . . .	11684 .	30.960	13 27.10	11 34 8					Telescope west.
Mars . . .	S.L. .	43.030	18 41.76	. . .	5 41 56				Micrometer head below.
H. C. . . .	11684 .	30.971	13 27.39	11 46 4					Planet south of star.
Mars . . .	N.L. .	42.394	18 25.18	. .	5 53 50	29.956	67.5	67.1	The long intervals between the observations were caused by floating clouds carried by a brisk southeaster.
H. C. . . .	11684 .	30.812	13 23.25	12 8 18					
Mars . . .	S.L. .	42.754	18 34.56	. . .	6 16 5				
H. C. . . .	11684 .	30.863	13 24.57	12 17 42					
Mars . . .	N.L. .	42.143	18 18.63	. . .	6 26 30				
H. C. . . .	11684 .	30.950	13 26.84	12 28 16					
Mars . . .	S.L. .	42.778	18 35.19	. . .	6 41 3	29.956	67.5	67.0	

DECEMBER 4, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . . 11684 .	30 938	13 26 53	11 32 0	. . .	29.973	65.5	65.2	Power 161.
Mars . . . N.L .	35.602	15 22.12	. . .	5 38 17				Wire *within* limb.
H. C. . . . 11684 .	31.042	13 29.24	11 38 34					Telescope west.
Mars . . . S.L. .	36.221	15 44.25	. . .	5 44 50	29.967	65.4	65.2	Micrometer head below.
H. C. . . . 11684 .	31.050	13 29.45	11 45 4					Planet south of star.
Mars . . . N.L. .	35.570	15 27.27	. . .	5 51 22	29.960	65.3	65.1	Flocculent definition.
H. C. . . . 11684 .	31.060	13 29.71	11 52 0					Clear air.
Mars . . . S.L. .	36.118	15 41.37	. . .	5 58 18	29.960	65.3	65.1	Brisk southeaster.
H. C. . . . 11684 .	31.050	13 29.45	11 58 56					Cloudless sky.
Mars . . . N.L. .	35.575	13 27.40	. . .	6 5 13	29.959	65.3	65.1	
H. C. . . . 11684 .	31.030	13 28.93	12 5 8					
Mars . . . S.L. .	36.095	15 40.97	. . .	6 11 24	29.959	65.3	65.1	
H. C. . . . 11684 .	31.020	13 28.67	12 12 1	. . .	29.959	65.3	65.1	
Mars . . . N.L. .	35.460	15 24.41	. . .	6 18 14				
H. C. . . . 11684 .	31.085	13 30.36	12 20 8	. . .	29.959	65.2	65.2	
Mars . . . S.L. .	36.101	15 41.13	. . .	6 26 54				

One revolution of micrometer = 26″.06925.

DECEMBER 5, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . . 11684 .	32.018	13 54.68	11 21 52	. . .	29.888	68.2	68.0	Power 161.
Mars . . . N.L. .	30.073	13 3.98	. . .	5 26 37				Wire *within* limb.
H. C. . . . 11684 .	32.028	13 54.94	11 29 40					Telescope west.
Mars . . . S.L. .	30.639	13 18.73	. . .	5 34 26	29.888	68.2	68.0	Micrometer head below.
H. C. . . . 11684 .	32.090	13 56.56	11 35 8					Planet north of star.
Mars . . . N.L. .	30.060	13 3.64	. . .	5 39 53				Flocculent definition.
H. C. . . . 11684 .	32.070	13 56 04	11 39 35					
Mars . . . S.L. .	30.658	13 19.23	. . .	5 44 22	29.880	68.2	68.0	
H. C. . . . 11684 .	32.039	13 55.23	11 44 52					
Mars . . . N.L. .	30.040	13 3.12	. . .					
H. C. . . . 11684 .	32.043	13 55.34	11 50 0					
Mars . . . S.L. .	30.600	13 17.72	. . .	5 54 45				
H. C. . . . 11684 .	32.056	13 55.67	11 55 20					
Mars . . . N.L. .	30.003	13 2.15	. . .	6 0 5	29.876	67.8	67.5	
H. C. . . . 11684 .	32 046	13 55.31	12 1 24					
Mars . . . S.L. .	30.562	13 16.73	. . .	6 6 6				
H. C. . . . 11684 .	32.090	13 56.56	12 5 41					
Mars . . . N.L. .	29.964	13 1.14	. . .	6 10 26				
H. C. . . . 11684 .	32.054	13 55.62	12 10 47					
Mars . . . S.L. .	30.520	13 15.63	. . .	6 15 30	29.874	67.4	67.0	

One revolution of micrometer = 26″.06925.

DECEMBER 6, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers.		Remarks.
						Att.	Free.	
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N.L. .	21.796	9 28.20	11 25 44	5 28 55	29.970	68.2	67.3	Power 273.
Mars . . . S.L. .	22.189	9 38.45	11 29 20	5 32 32				Wire *within* limb.
Mars . . . N.L. .	21.646	9 24.29	11 35 40	5 38 50				Zero wire employed for H C. 11684.
Mars . . . S.L. .	22.206	9 38.89	11 38 29	5 41 40				Micrometer wire employed for planet.
Mars . . . N.L. .	21.624	9 23.72	11 41 15	5 44 25				Each micrometer reading gives an independent measure of a limb from the star.
Mars . . . S.L. .	22.206	9 38.89	11 45 16	5 48 23				
Mars . . . N.L. .	21.608	9 23.30	11 49 12	5 52 20				
Mars . . . S.L. .	22.161	9 37.72	11 52 32	5 55 40				
Mars . . . N.L. .	21.560	9 22.05	11 55 18	5 58 23				
Mars . . . S.L. .	22.179	9 38.19	11 58 15	6 1 22	29.972	68 0	67.2	
Mars . . . N.L. .	21.501	9 20.51	12 16 25					
Mars . . . S.L. .	22.031	9 34.33	12 19 14	6 22 23				
Mars . . . N.L. .	21.480	9 19.97	12 22 30	6 25 38				
Mars . . . S.L. .	22.035	9 34.43	12 26 33	6 29 42				
Mars . . . N.L. .	21.476	9 19.87	12 29 12	6 32 22				
Mars . . . S.L. .	21.990	9 33.26	12 31 56	6 35 6				
Mars . . . N.L. .	21.381	9 17.38	12 35 2	6 38 10				
Mars . . . S.L. .	21.979	9 32.98	12 38 2	6 41 8				
Mars . . . N.L. .	21.372	9 17.15	12 40 36	6 43 48				
Mars . . . S.L. .	21.973	9 32.82	12 43 20	6 46 30	29 960	67.4	66.5	

Coincidence of wires to be applied; and as the zero wire was not disturbed throughout, but the telescope moved in declination to bisect the star, the coincidence applies to all.

29.961	29.970
30.035	30.045
29.955	.972
30.052	.046
29.965	.965
30.048	.052
29.962	.967
30.050	.050
29.962	.964
30.048	.050
30.0038	30.0081

Mean = 30.006 rev. 1 rev. = 26″.06925.

DECEMBER 7, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers.		Remarks.
						Att.	Free.	
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L.	15.572	6 45.95	11 13 24	. . .	29.988	67.5	67.0	Zero wire placed on H. C. 11684 by moving the declination circle.
Mars . . . . S.L.	16.200	7 2.32	11 16 49					Micrometer wire *within* limb.
Mars . . . . N.L.	15.502	6 44.12	11 19 47					Each measure independent.
Mars . . . . S.L.	16.130	7 0.50	11 21 46					
Mars . . . . N.L.	15.528	6 44.80	11 23 51					
Mars . . . . S.L.	16.150	7 0.76	11 26 35					
Mars . . . . N.L.	15.480	6 43.55	11 29 40					
Mars . . . . S.L.	16.134	7 0.60	11 31 26					
Mars . . . . N.L.	15.465	6 43.16	11 33 17					
Mars . . . . S.L.	16.083	6 59.04	11 36 08					+ coincidence, which is eliminated by com-

After tenth measure, position circle verniers turned 180°. Screw-head now below. The cross eliminates the coincidence of the wires by taking the mean of screw above and screw below.

DECEMBER 7, 1849—Continued.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L.	44.722	19 25.87	11 56 07	. . .	29.960	67.2	66.6	bining screw-head above with screw-head below.
Mars . . . . S.L.	44.080	19 9.13	11 59 00					
Mars . . . . N.L.	44.795	19 27.74	12 1 39					Not time to note the clock times for planet; but the horary circle is as accurate.
Mars . . . . S.L.	44.050	19 8.35	12 4 22					
Mars . . . . N.L.	44.741	19 26.36	12 6 41					
Mars . . . . S.L.	44.062	19 8.66	12 9 16					
Mars . . . . N.L.	44.670	19 24.51	12 12 16					
Mars . . . . S.L.	44.080	19 9.13	12 15 44					
Mars . . . . N.L.	44.730	19 26.07	12 18 08					Wretchedly bad definition.
Mars . . . . S.L.	44.114	19 10.02	12 20 29	. . .	29.960	66.8	66.4	

One revolution of micrometer = 26″.06925.

DECEMBER 8, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L.	50.292	21 51.05	11 39 37	. . .	30.027	71.0	70.2	Power 273.
Mars . . . . S.L.	49.700	21 35.64	11 41 00					Telescope west.
Mars . . . . N.L.	50.270	21 50.50	11 44 16					Wire *within* limb.
Mars . . . . S.L.	49.726	21 36.06	11 48 00					Indifferent definition.
Mars . . . . N.L.	50.322	21 51.57	11 51 10					Southeast wind.
Mars . . . . S.L.	49.786	21 37.88	11 54 19					Other circumstances as yesterday.
Mars . . . . N.L.	50.331	21 51.80	11 57 31					
Mars . . . . S.L.	49.819	21 38.74	12 0 22					
Mars . . . . N.L.	50.371	21 52.84	12 3 36					
Mars . . . . S.L.	49.745	21 36.81	12 6 29					
Mars . . . . N.L.	9.480	4 7.14	12 21 03					
Mars . . . . S.L.	10.075	4 22.65	12 24 17					
Mars . . . . N.L.	9.490	4 7.40	12 27 12					
Mars . . . . S.L.	10.048	4 21.94	12 30 00					
Mars . . . . N.L.	9.430	4 5.83	12 32 56					
Mars . . . . S.L.	10.038	4 21.68	12 36 00					
Mars . . . . N.L.	9.438	4 6.04	12 39 05					
Mars . . . . S.L.	10.014	4 21.05	12 42 14					After tenth measure, reversed position circle verniers, to eliminate coincidence of wires.
Mars . . . . N.L.	9.411	4 5.34	12 45 06					
Mars . . . . S.L.	9.980	4 20.17	12 48 14	. . .	30.028	70.0	69.0	

One revolution of micrometer = 26″.06925.

DECEMBER 9, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
139 Tauri	12.404	5 23.36	12 58 20	. . .	30.102	65.8	65.1	Power 273.
Mars . . . N.L. .	53.198	23 6.83	. . .	6 56 36				Telescope west.
H.C. . . . 11684 .	27.245	7 29 56						

DECEMBER 9, 1849—Continued.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. F ee.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
139 Tauri	12.308	5 20.86	12 13 56	. . .	30.102	65.8	65.1	Wire *within* limb.
Mars . . . S.L. .	52.640	22 52.28	. . .	6 12 10				Screw-head above.
H.C. . . . 11684 .	(Lost.)							Both axes clamped.
139 Tauri	12.260	5 19.60	12 32 13					Unusually bad definition.
Mars . . . N.L. .	53.224	23 7.51	. . .	6 30 26				Strong southeast-by-south wind.
H.C. . . . 11684 .	27.128	7 26.51						Micrometer wire only used.
139 Tauri	12.127	5 16.14	12 49 26					
Mars . . . S.L. .	52.564	22 50.30	. . .	6 47 38				
H.C. . . . 11684 .	27.070	7 25.00	. . .	. . .	30.094	64.8	64.2	

One revolution of micrometer = 26″.06925.

DECEMBER 10, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H.C. . . . 11108 .	28.370	12 19.58	12 38 17					Power 273.
Mars . . . N.L. .	11.867	5 9.36	. . .	6 34 44	29.798	64.8	64.6	Telescope west.
H.C. . . . 11108 .	28.225	12 15.80	12 44 9	. . .	29.787	64.4	64.1	Wire *within* limb.
Mars . . . S.L. .	11.143	4 50.49	. . .	6 50 40				Both axes clamped.
H.C. . . . 11108 .	28.078	12 11.97	13 9 12	. . .	29.775	64.0	63.6	Micrometer wire alone used, and used for both.
Mars . . . N.L. .	11.730	5 5.79	. . .	7 5 40				
H.C. . . . 11108 .	27.877	12 6.73	13 24 44	. . .	29.767	63.6	63.2	Splendid definition.
Mars . . . S.L. .	11.008	4 46.97	. . .	7 21 14				
H.C. . . . 11108 .	32.656	14 11.31	13 43 5	. . .	29.762	63.3	63.1	After the eighth measure, reversed position verniers 180°, screw-head now down.
Mars . . . N.L. .	48.887	21 14.45	. . .	7 39 33				
H.C. . . . 11108 .	32.930	14 18.46	14 2 4	. . .	29.755	63.1	63.0	
Mars . . . S.L. .	49.721	21 36.19	. . .	7 58 28				
H.C. . . . 11108 .	33.250	14 26.80	14 19 0	. . .	29.750	63.0	62.8	
Mars . . . N.L. .	49.344	21 26.35	. . .	8 15 28	29.747	63.0	62.6	
H.C. . . . 11108 .	33.672	14 37.80	14 35 53	. . .	29.744	62.9	62.5	
Mars . . . S.L. .	50 303	21 51.36	. . .	8 32 20	29.744	62.9	62.3	

One revolution of micrometer = 26″.06925.

DECEMBER 11, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . . 11108	30.177	13 6.69	12 0 30	. . .	29.758	62.4	62.6	Power 273.
Mars . . . N.L.	41.886	18 11.93	. . .	5 54 50				Telescope west.

DECEMBER 11, 1849—Continued.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers.		Remarks.
							Att.	Free.	
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . .	11108	30.156	13 4.14	12 17 31	. . .	29.758	62.2	62.4	Micrometer-head below.
Mars . . .	S.L.	Cloud.							Planet south of star.
H. C. . . .	11108	30.180	13 6.76	12 37 34	. . .	29.758	62.0	62.3	Micrometer used for both objects.
Mars . . .	S.L.	42.408	18 25.54	. . .	6 32 22				
H. C. . . .	11108	30.250	13 8.58	12 51 44	. . .	29.757	61.6	62.0	
Mars . . .	N.L.	41.800	18 9.68	. . .	6 46 32				

One revolution of micrometer = 26″.06925.

Rain prevented further observations. The above are all that could be obtained between 5*h.* and 6*h.* 47*m.* sid. time.

DECEMBER 14, 1849.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers.		Remarks.
							Att.	Free.	
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . .	11108	30.321	13 10.44	11 26 26					Power 273.
Mars . . .	N.L.	29.430	12 47.21	. . .	5 16 1	30.210	64.0	63.4	Telescope west.
H. C. . . .	11108	30.310	13 10.15	11 38 35					Both axes clamped.
Mars . . .	S.L.	30.024	13 2.70	. . .	5 28 12	30.210	64.0	63.4	Micrometer-head below, and driven + to No. 5, then —.
H. C. . . .	11108	30.348	13 11.14	11 45 57					
Mars . . .	N.L.	29.384	12 46.01	. . .	5 35 33	30.210	64.0	63.3	Planet north of star.
H. C. . . .	11108	30.381	13 12.00	11 52 33					Nearly calm; fair definition; clear sky.
Mars . . .	S.L.	30.024	13 2.70	. . .	5 42 8	30.208	64.0	63.1	Micrometer used for both objects.
H. C. . . .	11108	30.410	13 12.76	11 59 0					
Mars . . .	N.L.	29.423	12 47.03	. . .	5 48 33	30.206	64.0	63.2	
H. C. . . .	11108	30.420	13 13.02	12 5 48					
Mars . . .	S.L.	30.036	13 3.01	. . .	5 55 33	30.201	64.0	63.2	
H. C. . . .	11108	30.432	13 13.33	12 12 36					
Mars . . .	N.L.	29.410	12 46.69	. . .	6 2 11	30.200	64.0	63.2	
H. C. . . .	11108	30.498	13 15.05	12 22 35					
Mars . . .	S.L.	30.077	13 4.08	. . .	6 12 10	30.198	63.8	63.2	
H. C. . . .	11108	30.528	13 15.83	12 29 22					
Mars . . .	N.L.	29.502	12 49.09	. . .	6 18 57	30.197	63.8	63.2	
H. C. . . .	11108	30.656	13 19.17	12 35 59					
Mars . . .	S.L.	30.162	13 6.29	. . .	6 25 35	30.196	63.8	63.2	

One revolution of micrometer = 26″.06925.

DECEMBER 15, 1849.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers.		Remarks.
							Att.	Free.	
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . .	11108 .	29.961	13 1.05	11 18 50	. . .	30.124	67.5	66.8	Power 273.
Mars . . .	N.L. .	25.557	11 6.25	. . .	5 6 30				Telescope west.

DECEMBER 15, 1849—Continued.

Name.		Micr.	Arc equivalent.	Hour circle	Clock.	Bar.	Thermometers.		Remarks.
							Att.	Free.	
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . .	11108 .	29.902	12 59.51	11 23 40	. . .	30.116	67.3	66.7	Wire *within* limb.
Mars . . .	S.L. .	26.153	11 21.78	. . .	5 11 30				Micrometer head below.
H. C. . .	11108 .	29.868	12 58.63	11 29 11	. . .	30.116	67.2	66.5	Micrometer used for both objects.
Mars . . .	N.L. .	25.530	11 5.54						Light southeast wind.
H. C. . . .	11108 .	29.902	12 59.51	11 35 0	. . .	30.114	67.2	66.5	Bad definition ; limb guessed at.
Mars . . .	S.L. .	26.038	11 18.79	. . .	5 22 52				
H. C. . . .	11108 .	29.884	12 59.05	11 39 56	. . .	30.114	67.1	66.5	
Mars . . .	N.L. .	25.519	11 5.26	. . .	5 27 48				
H. C. . . .	11108	29.857	12 58.34	11 45 24	. . .	30.114	67.1	66.4	
Mars . . .	S.L. .	26.030	11 18.58	. . .	5 33 17				
H. C. . . .	11108 .	29.820	12 57.38	11 55 3	. . .	30.110	67.1	66.4	
Mars . . .	N.L. .	25.330	11 0.33	. . .	5 42 53				Bad.
H. C. . . .	11108 .	29 830	12 57.64	12 0 29	. . .	30.108	67.1	66.4	
Mars . . .	S.L. .	25.919	11 15.68	. . .	5 48 19				
H. C. . . .	11108 .	29.866	12 58.58	12 5 18	. . .	30.108	67.1	66.4	
Mars . . .	N.L. .	25.367	11 1.29	. . .	5 53 10				
H. C. . . .	11108 .	29 845	12 58.03	12 10 8	. . .	30.108	67.1	66.4	
Mars . . .	S.L. .	25.932	11 16.02	. . .	5 57 57				

One revolution of micrometer = 26″.06925.

DECEMBER 16, 1849.

Name.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers.		Remarks.
							Att.	Free.	
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . .	11108 .	29.710	12 54.51	11 27 5	. . .	29.974	69.6	68.4	Power 273.
Mars . . .	N.L. .	21.946	9 32.11	. . .					Telescope west.
H. C. . . .	11108 .	29.698	12 54.20	11 32 36					Micrometer head below, and used for both objects.
Mars . . .	S.L. .	22.737	9 52.73	. . .					
H. C. . . .	11108 .	29.719	12 54.74	11 36 34					Wire *within* limb.
Mars . . .	N.L. .	22.065	9 35.21	. . .					Southeast wind.
H. C. . . .	11108 .	29.700	12 54.25	11 39 42					Very bad definition.
Mars . . .	S.L. .	22.745	9 52.94	. . .					
H. C. . . .	11108 .	29.720	12 54.77	11 42 5	. . .	29.973	69.6	68.5	
Mars . . .	N.L. .	22.044	9 34.66	. . .					
H. C. . . .	11108 .	29.755	12 55.68	11 44 18					
Mars . . .	S.L. .	22.754	9 53.17	. . .					
H. C. . . .	11108 .	29.784	12 56.44	11 46 47					
Mars . . .	N.L. .	22.072	9 35.40	. . .					
H. C. . . .	11108 .	29.740	12 55.29	11 49 48					
Mars . . .	S.L. .	22.690	9 51.50	. . .					
H. C. . . .	11108 .	29.731	12 55.06	11 52 0					
Mars . . .	N.L. .	22.042	9 34.61	. . .					

DECEMBER 16, 1849—Continued.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H C. 11108	29.716	12 54.67	11 54 32	. . .	29.972	69.6	68.6	
Mars . . . . S.L.	22.675	9 51.11	. .					
Mars . . . . S.L.	23.076	10 1.57	12 11 46	. . .	29.970	69.6	68.6	Power 273.
Mars . . . . N.L.	22.365	9 43.03						Telescope west, and polar axis only clamped.
Mars . . . . S.L.	22.998	9 59.53	12 15 28	. . .	29.967	69.6	68.8	H. C. 11108 observed on zero wire by gently tapping the telescope.
Mars . . . . N.L.	22.365	9 43.03						
Mars . . . . S L.	23.015	9 59.98	12 18 36	. . .	29.964	69.6	68.8	Micrometer wire placed on limbs of planet while transiting, instead of on entering the field; then read off. Next on opposite limb and read off; scarcely time to do this properly.
Mars . . . . N.L.	22.300	9 41.34						
Mars . . . . S L.	23.002	9 59.64	12 20 52	. . .	29.962	69.6	68.9	
Mars . . . . N.L.	22.376	9 43.32						
Mars . . . . S.L.	22.970	9 58.80	12 23 6	. . .	29.962	69.6	68.9	
Mars . . . . N.L.	22.355	9 42.77						
Mars . . . . N.L.	37.800	16 25.11	12 38 18	. . .	29.961	69.6	69.0	Screw always driven +, viz: in the order of increasing reading of screw-head.
Mars . . . . S.L.	37.150	16 8.46						
Mars . . . . N.L	37.758	16 24.31	12 40 42	. . .	29.960	69 6	69.1	When the clock time is not entered there was not time for noting it. It is generally useless for the measures, for the A. R. verniers are sensibly in position, and the A. R. of Mars can always be had to the nearest second by employing the hour angle in conjunction with the time of transiting the meridian, or the A. R. of the star.
Mars . . . . S.L.	37.134	16 8.05						
Mars . . . . N.L	37.818	16 25.88	12 42 48	. . .	29.958	69.6	69.1	
Mars . . . . S.L.	37.178	16 9.46						
Mars . . . . N.L.	37.750	16 24.10	12 44 46	. . .	29.956	69.6	69.2	
Mars . . . . S.L.	37.108	16 7.37						
Mars . . . . N.L.	37.845	16 26.58	12 47 16	. . .	29.955	69.6	69.2	
Mars . . . . S.L.	37.210	16 10.03						

One revolution of micrometer = 26″.06925.

After tenth measure turned the position circle verniers 180° to eliminate the coincidence of the wires.

DECEMBER 17, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L.	17.575	7 38.16	12 12 34	. . .	30.043	69 2	68.5	H. C. 11108.
Mars . . . . S.L.	18.110	7 52.11	12 16 51					Power 273.
Mars . . . . N.L.	17.561	7 37.80	12 19 45	. . .	30.040	69.0	68.4	Telescope west, and clamped in A. R. only.
Mars . . . . S.L.	18.192	7 54.25	12 22 0					Wire *within* limb.
Mars . . . . N.L	17.565	7 37.90	12 24 15	. . .	30.038	68.8	68.3	Only limb observed at each clamping.
Mars . . . . S.L.	18.144	7 53.00	12 27 4					Zero wire on preceding object: by moving telescope in declination.
Mars . . . . N.L.	17.615	7 39.21	12 29 11	. . .	30.036	68.6	68.3	Fair definition.
Mars . . . . S.L.	18.084	7 51.43	12 31 9					
Mars . . . . N.L	17.532	7 37.04	12 33 56	. . .	30.030	68.4	68.2	
Mars . . . . S.L.	18.120	7 52.37	12 36 2					
Mars . . . . S.L.	37.900	16 28.01	12 49 8	. . .	30.030	68.3	68.2	
Mars . . . . N.L.	38.454	16 42.46	12 51 50					
Mars . . . . S.L	37.900	16 28.01	12 53 48					
Mars . . . . N.L.	38.491	16 43.42	12 55 35					
Mars . . . . S.L.	37.941	16 29.08	12 57 20					
Mars . . . . N.L.	38.460	16 42.61	12 59 13					
Mars . . . . S.L	37.922	16 28.59	13 1 13					
Mars . . . . N.L.	38.588	16 45.95	13 4 0					
Mars . . . . S.L.	37.951	16 29.34	13 5 49	. . .	30.030	68.2	68.2	
Mars . . . . N.L.	38.462	16 42.67	13 7 43					

One revolution of micrometer = 26″.06925.

After tenth measure reversed the position circle verniers.

DECEMBER 18, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L	42.824	18 39.38	11 49 0	. . .	30.060	68.0	67.4	H. C. 11108.
Mars . . . . S.L	42.291	18 22.48	11 53 33	5 36 7				Power 273.
Mars . . . . N.L.	42.780	18 35.23	11 57 38	5 40 12	30.059	68.0	67.4	Telescope west.
Mars . . . . S.L.	42.305	18 22.85	12 1 16	5 43 52				Wire *within* limb.
Mars . . . . N.L.	42.860	18 37.32	12 4 32	5 47 7	30.056	67.8	67.2	Planet north of star.
Mars . . . . S.L.	42.330	18 23.50	12 8 0	5 50 34				Zero wire for planet; micrometer on star.
Mars . . . . N.L.	42.886	18 38.00	12 12 8	5 54 43	30.054	67.6	67.1	Polar axis only clamped.
Mars . . . . S.L.	42.322	18 23.29	12 15 33	5 58 6				Fair definition occasionally.
Mars . . . . N.L.	42.970	18 40.18	12 19 28	6 2 3	30.050	67.5	66.9	
Mars . . . . S.L.	42.346	18 23.92	12 22 48	6 5 12				
Mars . . . . N.L.	17.177	7 27.79	12 36 33	6 19 5	30.048	67.3	66.8	
Mars . . . . S.L.	17.770	7 43.25	12 40 17	6 22 48				
Mars . . . . N.L.	17.188	7 28.07	12 44 0	6 26 33				
Mars . . . . S L.	17.705	7 41.55	12 47 19	6 29 51				
Mars . . . . N.L	17.145	7 26.95	12 51 3	6 33 35	30.046	67.2	66.8	
Mars . . . S.L.	17.660	7 40.38	12 55 1	6 37 31				
Mars . . . . N.L.	17.205	7 28.52	12 58 33	6 41 6				
Mars . . . . S.L.	17.622	7 39.39	13 2 57	6 45 24				
Mars . . . . N.L.	17.114	7 26.15	13 6 41	6 49 12	30.041	67.2	66.6	
Mars . . . . S.L.	17.589	7 38.53	13 10 8	6 52 41				

One revolution of micrometer = 26″.06925.

After the tenth measure, reversed the position circle verniers.

DECEMBER 20, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L.	26.215	11 23.40	11 37 5	5 16 12	30.102	64.0	63.3	H. C. 10669.
Mars . . . . S.L.	25.573	11 6.66	11 46 1	5 25 8	30.101	64.0	62.8	Power 273.
Mars . . . . N.L.	26.265	11 24.70	11 55 46	5 34 54	30 101	64.0	62.8	Telescope west.
Mars . . . . S.L.	25.576	11 6.74	12 3 44	5 42 50	30.101	64.0	62.7	Wire *within* limb.
								Planet south of star.
Mars . . . . N.L.	33.839	14 42.15	12 15 45	5 54 49	30.104	63.8	62.6	Polar axis only clamped.
Mars . . . . S.L.	34.370	14 55.99	12 24 48	6 3 53	30.106	63.6	62.4	Zero wire on star.
Mars . . . . N.L.	33.770	14 40.35	12 34 29	6 13 32	30.108	63.2	62.0	Remarkably bad definition.
Mars . . . . S.L.	34.362	14 55.78	12 43 28	6 22 30	30 109	63.0	62.0	

One revolution of micrometer = 26″.06925.

After the fourth measure, reversed the position circle verniers.

DECEMBER 21, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L.	32.505	14 7.38	12 31 44	6 9 2	30.149	62.0	61.4	H. C. 10669.
Mars . . . . S.L.	33.050	14 21.59	12 37 35	6 15 54	30.149	62.0	61.4	Power 273.
Mars . . . . N.L.	32.450	14 5.95	12 45 7	6 22 24	30.148	62 0	61.4	Telescope west.
Mars . . . . S.L.	33.054	14 21.69	12 52 14	6 23 30	30.145	62.0	61.4	Wire *within* limb.

DECEMBER 21, 1849—Continued.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L.	27.609	11 59.85	12 2 0	6 39 21	30.144	62.0	61.4	Zero on star.
Mars . . . . S.L.	27.012	11 44.18	12 8 41	6 46 1	30.143	62.0	61.4	Polar axis only clamped.
Mars . . . . N.L.	27.685	12 1.73	12 15 40	6 53 1	30.138	62.0	61.4	Remarkably good definition.
Mars . . . . S.L.	27.037	11 44.83	12 22 36	6 59 54	30.135	62.0	61.3	The commencement of the observations delayed by visitors to the telescope.

One revolution of micrometer = 26″.06925.

After fourth measure reversed the position circle verniers.

DECEMBER 22, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . . N.L.	28.696	12 28.08	12 18 52	5 54 33	29.999	66.8	66.0	H. C. 10669.
Mars . . . . S.L.	28.050	12 11.24	12 23 58	5 59 38	29.996	66.7	66.0	Power 273.
Mars . . . N.L.	28.664	12 28.92	12 29 19	6 4 58	29.994	66.6	66 0	Telescope west.
Mars . . . . S.L.	28.120	12 12.60	12 34 1	6 9 44	29.993	66.4	65.8	Wire *within* limb.
								Zero wire on star.
Mars . . . . N.L.	31.504	13 41.28	12 45 0	6 20 39	29.992	66.4	65.8	Very good definition.
Mars . . . . S.L.	32.048	13 55.47	12 49 49	6 25 28	29.990	66.3	65.8	
Mars . . . . N.L.	31.456	12 40.03	12 54 47	6 30 26	29.988	66.3	65.6	The occultation of Saturn delayed the commencement.
Mars . . . . S.L.	32.042	12 55.31	12 59 28	6 35 7	29.985	66.3	65.6	

One revolution of micrometer = 26″.06925.

After fourth measure reversed the position circle verniers.

DECEMBER 23, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. . . . 10669 .	29.877	12 58.61	11 54 5	. . .	29.939	70.4	69.5	Power 273.
Mars . . . N.L. .	30.603	13 17.80						Telescope west.
								Micrometer wire *within* limb.
H. C. . . . 10669 .	29.934	13 0.36	11 57 33	. . .	29.936	69.6	69.4	Head below, and used for both star and planet.
Mars . . . S.L. .	31.182	13 32.89						Polar and declination axes clamped.
								Clouds prevented other observations.

One revolution of micrometer = 26″ 06925.

DECEMBER 24, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers.		Remarks.
						Att.	Free.	
	Bar.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
H. C. 10669	30.000	13 2.08	. . .	6 25 8				
Mars	28.746	12 29.39	. . .	6 27 0	30.102	63.8	63.4	
Mars	27.584	11 59.09	. . .	6 32 45 6 34 30				
Mars	26.322	11 26.19	. . .	6 37 0 6 38 0				

6) 3.678 rev. = 0.613 rev. = 15″.98.

One revolution of micrometer = 26″.06925.

Mars compared with H. C 10669. The star became faint on the approach of the planet, and finally could not be distinguished. The several powers were tried in succession without avail. The above observations were made after the star escaped from the rays, and by repetition, using the "driving clock," as when measuring double stars. The measures are in declination between the star and the planet's *centre*. The star still too faint for good work. Power 161 employed. Planet's centre true *south* of star.

DECEMBER 25, 1849.

Remarks.		Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers		Remarks.
							Att.	Free.	
		Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . .	N.L. .	29.701	12 54.28	11 25 57	4 56 46	30.096	66.2	66.0	
H. C. . . .	10669 .	29.448	12 47.68						
Mars . . .	S.L. .	30.236	13 8.22	11 28 12	5 0 0				
H. C. . . .	10669 .	29.415	12 46.82						
Mars . . .	N.L. .	29.692	12 54.04	11 31 25	5 2 32				
H. C. . . .	10669 .	29.408	12 46.64						
Mars . . .	S.L. .	30.220	13 7.80	11 34 3	5 4 50				
H. C. . . .	10669 .	29.392	12 46.22						
Mars . . .	N.L. .	29.612	12 51.96	11 36 32	5 7 20				
H. C. . . .	10669 .	29.382	12 45.96						
Mars . . .	S.L. .	30.206	13 7.44	11 38 53	5 9 43				
H. C. . . .	10669 .	29.360	12 45.39						
Mars . . .	N.L. .	29.658	12 53.15	11 41 24	5 12 14				
H. C. . . .	10669 .	29.414	12 46.79						
Mars . . .	S.L. .	30.256	13 8.74	11 44 5	5 14 55				
H. C. . . .	10669 .	29.385	12 46.04						
Mars . . .	N.L. .	29.648	12 52.89	11 46 46	5 17 35				
H. C. . . .	10669 .	29.400	12 46.43						
Mars . . .	S.L. .	30.190	13 7.02	11 49 4	5 19 53	30.096	65.6	65.3	
H. C. . . .	10669 .	29.396	12 46.32						
Mars . . .	N.L. .	29.604	12 51.75	11 56 32	5 27 20	30.096	65.5	65.2	Power 273. Telescope west of pier.
H. C. . . .	10669 .	29.360	12 45.39						
Mars . . .	S.L. .	30.200	13 7.28	11 59 0	5 29 47				Micrometer wire used for both objects. Wire *within* limb.
H. C. . . .	10669 .	29.335	12 44.73						

DECEMBER 25, 1849—Continued.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N L. .	29.652	12 53.00	12 1 29	5 32 19				Both axes clamped.
H. C. . . . 10669 .	29.363	12 45.46						Excellent definition until towards the end.
Mars . . . S L. .	30.203	13 7.36	12 4 4	5 34 51				Eight measures by repetition for diameter in declination after the other measures, and when the definition was failing, = 66″.635, the wire being *without* the limb. ∴ 8″.329 — .47 = 7″.86.
H. C. . . . 10669 .	29.350	12 45.12						Thickness of wire = 0″.94.
Mars . . . N.L. .	29.611	12 51.93	12 6 38	5 37 24	. .	65.3	65.0	
H. C. . . . 10669 .	29.350	12 45.12						
Mars . . . S.L. .	30.220	13 7.80	12 9 17	5 40 5				
H. C. . . . 10669 .	29.355	12 45.26						
Mars . . . N.L. .	29.620	12 52.16	12 11 53	5 42 40	. .	65.2	64.8	
H. C. . . . 10669 .	29.382	12 45.96						
Mars . . . S.L. .	30.240	13 8.33	12 14 29	5 45 16				
H. C. . . . 10669 .	29.394	12 46.27						
Mars . . . N.L. .	29.666	12 53.36	12 16 52	5 47 38				
H. C. . . . 10669 .	29.386	12 46.06						
Mars . . . S.L. .	30.240	13 8.33	12 19 20	5 50 5	30.096	65.0	64.6	
H. C. . . . 10669 .	29.368	12 45.59						

One revolution of micrometer = 26″.06925.

DECEMBER 26, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N.L. .	30.725	13 20.98	10 55 35	. . .	29.910	68.0	67.5	Power 273.
H. C. . . . 10669 .	30.286	13 9.53						Micrometer head below.
Mars . . . S.L. .	31.246	13 34.56	11 1 24	4 30 40				Micrometer wire used for both objects.
H. C. . . . 10669 .	30.250	13 8.59						Telescope west, and both axes clamped.
Mars . . . N.L. .	30.707	13 20.51	11 5 39	4 34 55				Wire *within* limb.
H. C. . . . 10669 .	30.200	13 7.29						Excellent definition.
Mars . . . S.L. .	31.198	13 33.18	11 10 54	4 40 9				
H. C. . . . 10669 .	30.154	13 6.09						
Mars . . . N.L. .	30.590	13 17.46	11 15 15	4 44 30	29.910	67.8	67.4	
H. C. . . . 10669 .	30.105	13 4.81						
Mars . . . S.L. .	31.126	13 31.43	11 19 53	4 49 9				
H. C. . . . 10669 .	30.103	13 4.76						
Mars . . . N.L. .	30.534	13 16.00	11 24 18	4 53 33	29.906	67.6	67.2	
H. C. . . . 10669 .	30.096	13 4.69						
Mars . . . S.L. .	31 090	13 30.50	11 28 39	4 57 53				
H. C. . . . 10669 .	30.045	13 3.25						
Mars . . . N.L. .	30.496	13 13.01	11 34 53	5 4 9	29.903	67.6	67.1	
H. C. . . . 10669 .	30.026	13 2.87						
Mars . . . S.L. .	31.057	13 29.68	11 41 36	5 10 50	29.900	67.5	67.0	
H. C. . . . 10669 .	29.972	13 1.35						

DECEMBER 26, 1849—Continued.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N.L. .	30.535	13 16.02	11 56 1	. . .	29.900	67.5	67.0	Instrumental circumstances as stated on preceding page.
H. C. . . . 10669 .	31.081	13 30.26						
Mars . . . S.L. .	31.075	13 30.10	11 58 44					Northwester.
H. C. . . . 10669 .	31.000	13 28.15						Clouds coming over.
Mars . . . N.L. .	30.582	13 17.25	12 0 49					Definition sometimes very bad.
H. C. . . . 10669 .	31.055	13 29.58						
Mars . . . S.L. .	31.086	13 30.39	12 2 38					
H. C. . . . 10669 .	31.025	13 28.80						
Mars . . . N.L. .	30.533	13 15.97	12 4 16					
H. C. . . . 10669 .	31.070	13 29.97						
Mars . . . S.L. .	31.144	13 31.90	12 5 51					
H. C. . . . 10669 .	31.069	13 29.94						
Mars . . . N.L. .	30.609	13 17.95	12 7 30					
H. C. . . . 10669 .	31.077	13 30.15						
Mars . . . S.L. .	31.127	13 31.46	12 9 19					
H. C. . . . 10669 .	31.042	13 29.24						
Mars . . . N.L. .	30.616	13 18.63	12 11 18					
H. C. . . . 10669 .	31.051	13 29.48						
Mars . . . S.L. .	31.199	13 33.33	12 13 20	. . .	29.886	67.0	66.4	
H. C. . . . 10669 .	31.100	13 30.75						

One revolution of micrometer = 26″.06925.

DECEMBER 29, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N.L. .	32.213	13 59.76	11 42 39	5 7 23	29.976	68.6	63.3	Power 273.
H. C. . . . 10669 .	29.572	12 50.91		5 15 7				Telescope west.
Mars . . . S.L. .	32.800	14 15.06	11 53 14	5 17 57				Both axes clamped.
H. C. . . . 10669 .	29.585	12 51.25		. . .				Wire *within* limb.
Mars . . . N.L. .	32.282	14 1.56	12 2 56	5 27.39				Indifferent definition.
H. C. . . . 10669 .	29.656	12 53.10		. . .				
Mars . . . S.L. .	32.877	14 17.07	12 12 12	5 36.56				
H. C. . . . 10669 .	29.652	12 53.00		. . .				
Mars . . . N.L. .	32.323	14 2.63	12 21 20	5 46 5				
H. C. . . . 10669 .	29.660	12 53.21		. . .				
Mars . . . S.L. .	32.075	13 56.16	12 30 40	5 55 24	29.967	67.5	62.9	Clouds—overcast.

One revolution of micrometer = 26″.06925.

DECEMBER 30, 1849.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
Mars . . . N.L. .	33.419	14 31.20	. . .	. . .	30.030	69.6		
H. C. . . . 10669 .	29.592	12 51.43	. . .	. . .				

Overcast.

JANUARY 7, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	50.798	22 4.23	11 59 0	4 55 47	30.092	64.0	63.2	Power 273.
Mars . . . . N.L.	26.800	11 38.65		5 12 52				Telescope west.
B. A. C. . . . 1562	50.900	22 6.91	12 21 1	. . .	30.096	63.2	62.8	Both axes clamped.
Mars . . . . S.L.	27.411	11 54.58		5 34 53				Micrometer used for both limbs.
								Good definition.
B. A. C. . . . 1562	50.991	22 9.28	12 41 0	. . .	30.097	63.2	62.8	Cloudy weather from the 30th ultimo, until this night.
Mars . . . . N.L.	27.008	11 44.07		5 55.32				
B. A. C. . . . 1562	51.128	22 12.85	13 2 6	. . .	30.092	63.2	62.8	Interval in the A. R. too great for a telescope with short clamping leverage to be trusted.
Mars . . . . S.L.	27.745	12 3.29		6 15 58				

One revolution of micrometer = 26″.06925.

JANUARY 8, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
* . . . . . . * .	35.127	17 15.73	11 34 2	4 37 15	30.036	67.8	67.4	Power 273.
Mars . . . . N.L.	20.737	9 0.60		4 47 0				Micrometer wire used for both objects, and screw-head below.
* . . . . . . * .	35.156	17 15.49	11 50 3	4 53 16	. .	. .	. .	Both axes clamped.
Mars . . . . S.L.	21.367	9 17.02		5 3 2				
B. A. C. . . . 1562	42.684	18 14.91	12 15 39	5 12 30?	30.037	67.5	67.1	Telescope west.
Mars . . . . N.L.	21.042	13 29.24		5 28 36				Planet north of star.
B. A. C. . . . 1562	42.760	18 16.89	12 36 23	5 33 8	30.045	67.2	66.8	Bad definition.
Mars . . . . S.L.	21.680	13 45.87		5 49 21				
B. A. C. . . . 1562	42.840	18 35.81	12 56 23	5 53 8	30.053	66.8	66.2	
Mars . . . . N.L.	21.244	13 34.51		6 9 20				
B. A. C. . . . 1562	43.000	18 40.98	13 16 22	6 13 9	30.056	66.8	66.2	
Mars . . . . S.L.	21.960	13 53.17		6 29 18				

One revolution of micrometer = 26″.06925.

* This is not B. A. C. 1562.

JANUARY 9, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	40.806	17 43.78	11 17 22	. . .	30.093	66.6	65.8	Power 273.
Mars' centre . . .	21.782	9 27.84		4 29 29				Telescope west, and both axes clamped.
B. A. C. . . . 1562	40.764	17 42.69	11 40 4	. . .	30.096	66.6	65.8	Micrometer wire used for both objects.
Mars' centre . . .	Lost.	. .		4 36 49				Planet north of star.
B. A. C. . . . 1562	40.766	17 42.74	11 57 27	4 54 12	30.096	66.4	65.8	Most wretchedly bad definition.
Mars' centre . . .	21.911	9 49.45		5 9 33				
B. A. C. . . . 1562	40.776	17 43.00	12 15 27	5 12 10	30.097	66.2	65.8	
Mars' centre . . .	21.865	9 48.16		5 27 32				
B. A. C. . . . 1562	40.910	17 46.49	12 33 53	5 30.38	30.099	66.3	66.0	
Mars' centre . . .	21.968	9 50.85		5 45.58				

One revolution of micrometer = 26″.06925.

JANUARY 10, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	38.602	16 46.32	11 37 19	4 34 5	29.962	70.0	69.7	Power 273.
Mars' centre . . .	22.030	9 34.30		4 48 37				Telescope west.
B. A. C. . . . 1562	38.606	16 46.42	11 56 21	4 53 8	29.959	70.0	69.7	Micrometer wire for both objects.
Mars' centre . . .	22.054	9 34.93		5 7 38				Both axes clamped.
B. A. C. . . . 1562	38.708	16 49.08	12 17 41	. . .	29.954	69.8	69.2	Remarkably bad definition.
Mars' centre . . .	22.192	9 38.52		5 28 58				The planet a boiling mass of light.
B. A. C. . . . 1562	38.738	16 49.86	12 36 44	. . .	29.947	69.8	69.2	
Mars' centre . . .	22.224	9 39.36		5 48 4				

One revolution of micrometer = 26″.06925

JANUARY 11, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	38 010	16 30.88	11 58 20	4 55 8	29.872	73.0	72.4	Power 273.
Mars . . . . N.L.	23.706	10 17.99		5 8 53				Telescope west.
B. A. C. . . . 1562	38.122	16 33.80	12 17 2	. . .	29.874	73.0	72.0	Both axes clamped.
Mars . . . . S.L.	24.250	10 32.17		5 27 32				Micrometer wire for both objects.
B. A. C. . . . 1562	38.121	16 33.78	12 35 20	. . .	29.880	72.2	71.4	Screw-head below.
Mars . . . . N.L.	23.886	10 22.68		5 45 52				The day has been "burning" hot.
B. A. C. . . . 1562	38.211	16 36.12	12 52 42	. . .	29.884	72.0	71.4	
Mars . . . . S.L.	24.490	10 38.43		6 3 14				

One revolution of micrometer = 26″.06925.

JANUARY 12, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	33.409	14 30.95	12 11 46	5 8 31	30.054	65.0	64.6	Power 273.
Mars . . . . N.L.	21.627	9 23.80		5 21 36				Telescope west.
B. A. C. . . . 1562	33.430	14 31.49	12 27 44	. . .				Both axes clamped.
Mars . . . . S.L.	22.090	9 35.87		5 37 35	30.056	65.0	64.6	Micrometer wire for both objects.
B. A. C. . . . 1562	33.392	14 30.50	12 44 9	. . .	30.056	65.0	64.6	Good definition.
Mars . . . . N.L.	21.685	9 25.31		5 53 59				
B. A. C. . . . 1562	33.530	14 34.10	13 0 17	. . .	30.056	65.0	64.6	
Mars . . . . S.L.	22.265	9 40.43		6 10 9				

JANUARY 14, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	33.416	14 31.13	11 47 56	4 44 48	29.977	69.0	68.5	Power 273.
Mars . . . . N.L.	26.430	11 28.21		4 56 42				Telescope west.
B. A. C. . . . 1562	33.405	14 30.84	12 2 6	. . .	29.980	69.0	68.4	Both axes clamped.
Mars . . . . S.L.	26.915	11 41.65		5 10 51				Micrometer head below, and the wire used for both objects.
B. A. C. . . . 1562	33.386	14 30.35	12 18 12	. . .	29.988	69.0	68.4	Wire *within* limb, as usual, when the limb was observed.
Mars . . . . N.L.	26.449	11 28.71		5 27 0				
B. A. C. . . . 1562	33.440	14 31.76	12 32 33	. . .	29.990	69.0	68.4	Both objects occasionally steady.
Mars . . . . S.L.	26.975	11 43.22		5 41 17				Hazy weather at the beginning.
B. A. C. . . . 1562	33.408	14 30.92	12 47 42	. . .	29.990	68.8	68.2	
Mars . . . . N.L.	26.521	11 31 38		5 56 29				
B. A. C. . . . 1562	33.486	14 32.95	13 1 52	. . .	29.988	68.8	68.0	
Mars . . . . S.L.	27.078	11 45.90		6 10 38				

JANUARY 15, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	33.060	14 21.84	11 25 36	. . .	30.038	70.6	69.6	Power 273.
Mars . . . . N.L.	28.455	12 21.79		4 33 49				Other instrumental circumstances as before.
B. A. C. . . . 1562	33.076	14 22.26	11 40 11	4 37 4	30.039	70.5	69.4	Occasionally the images very bad.
Mars . . . . S.L.	28.909	12 33.63		4 48 25				
B. A. C. . . . 1562	33.072	14 22.15	11 55 3	4 51 56	30.042	70.2	69.2	
Mars . . . . N.L.	28.585	12 25.18		5 3 19				
B. A. C. . . . 1562	33.285	14 27.71	12 9 0	5 5 55	30.044	70.0	69.0	
Mars . . . . S.L.	29.172	12 40.48		5 17 15				

JANUARY 15, 1850—Continued.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	33.335	14 29.01	12 22 56	5 19 51	30.045	70.0	69.0	
Mars . . . . N.L.	28.813	12 31.13		5 31 12				
B. A. C. . . . 1562	33.406	14 30.86	12 36 56	5 33 51	30.045	69.4	68.5	
Mars . . . . S L.	29.350	12 45.12		5 45 9				

JANUARY 16, 1850.

Name.	Micr.	Arc equivalent.	Hourcircle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	32.783	14 14.62	12 2 3	4 58 56	30.010	70.8	69.6	Power 273.
Mars . . . . N.L	30.515	13 15.49		5 9 47				Instrumental circumstances as before.
B. A. C. . . . 1562	32.818	14 15.53	12 15 7	5 11 58	30.012	70.7	69.5	Good definition.
Mars . . . . S.L.	31.030	13 28.92		5 22 52				
B. A. C. . . . 1562	32.782	14 14.59	12 28 2	5 24 54	30.014	70.6	69.4	
Mars . . . . N.L.	30.563	13 16.75		5 35 46				
B. A. C. . . . 1562	32.815	14 15.45	12 40 55	5 37 47	30.015	70.4	69.2	
Mars . . . . S.L.	31.118	13 31.22		5 48 39				
B. A. C. . . . 1562	32.894	14 17.51	12 54 21	5 51 15	30.016	70.2	69.0	
Mars . . . . S.L.	31.171	13 32.60		6 1 6				
B. A. C. . . . 1562	32.930	14 18.45	13 8 35	6 5 26	30.016	70.0	68.8	
Mars . . . . N.L.	30.753	13 21.70		6 16 18				

JANUARY 17, 1850.

Name.	Micr.	Arc equivalent.	Hour circle.	Clock.	Bar.	Thermometers. Att.	Thermometers. Free.	Remarks.
	Rev.	′ ″	h. m. s.	h. m. s.	Inches.	°	°	
B. A. C. . . . 1562	32.145	13 57.99	11 16 56	4 13 39	29.960	72.5	71.5	Power 273.
Mars . . . . N.L.	32.013	13 54.55		4 24 9				Telescope west.
B. A. C. . . . 1562	32.089	13 56.53	11 29 17	4 26 0	29.958	72.5	71.4	Other instrumental circumstances as heretofore.
Mars . . . . S.L.	32.559	14 8.79		4 36 33				
B. A. C. . . . 1562	32.048	13 55.46	11 43 16	4 40 1	29.959	72.4	71.4	Occasionally a good definition.
Mars' centre . . .	32.250	14 0.73		4 50 31				
B. A. C. . . . 1562	31.502	13 41.23	12 13 43	5 10 28	29.961	72.2	71.2	After the sixth measure, the instrument was turned off to observe the occultation of ϕ Aquarii, and the centre of Mars was observed at the third observation to gain time for the purpose. After the occultation, the observations proceeded.
Mars . . . . N.L.	31.502	13 41.23		5 20 57				
B. A. C. . . . 1562	31.560	13 42.48	12 27 1	5 23 45	29.963	72.2	71.2	
Mars . . . . S.L.	32.014	13 54.58		5 34 20				
B. A. C. . . . 1562	31.548	13 42.17	12 40 46	5 37 31	29.964	72.1	71.1	
Mars . . . . N.L.	31.600	13 43.79		5 48 2				
B. A. C. . . . 1562	31.556	13 42.38	12 53 30	5 50 16	29.966	72.0	71.0	
Mars . . . . S.L.	32.076	13 56.20		6 1 45				

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Storage